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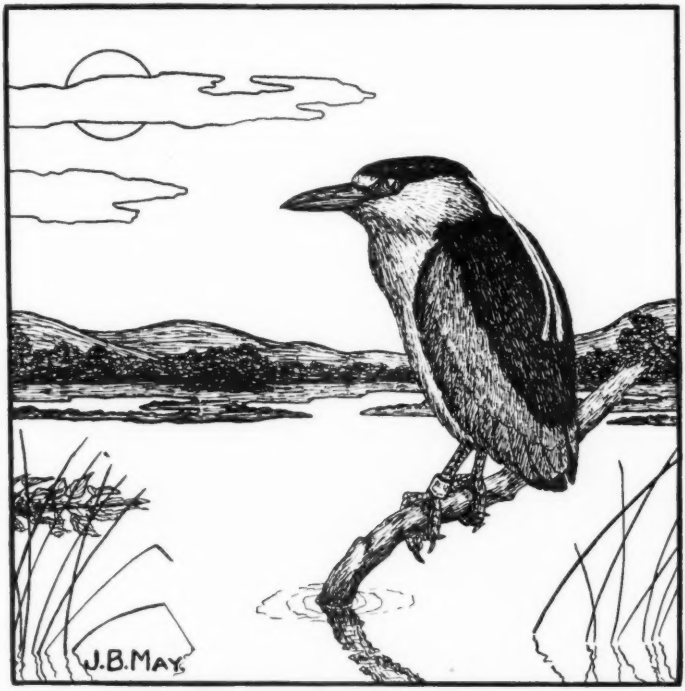

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BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. V. APRIL, 1934 No. 2

SOME MEASUREMENTS AND WEIGHTS OF LIVE BIRDS

By MRS. KENNETH B. WETHERBEE

IT was with the feeling that a great deal of valuable information was slipping through the hands of banders that I took up the measuring and weighing of birds as a part of the regular banding work. During the past two years approximately 2700 individuals, including more than seventy species, have been measured and weighed at my two banding stations at Worcester, Massachusetts, and Pomfret, Connecticut. Sufficient numbers of birds of some species have been measured and weighed to obtain fairly accurate averages, while in many cases only one individual of a species has been handled. Feeling that this phase of bird-study may be of interest to other banders, I have gathered together the data in the tabulation presented herewith.

I have found that a millimeter rule works practically as well as dividers in measuring birds in the hand accurately as well as quickly, as the position of the bird is not changed from the time the bird is taken from the gathering cage until it is placed in the bag for weighing. Birds are held in a position similar to that of Figure 62 in "The Manual for Bird Banders." In measuring, the bird is held in the left hand in as natural but straight a position as possible, the tip of the bill and end of rule are placed together against the edge of the banding table, and by touching the tip of tail and rule with right thumbnail the length is easily determined to a quarter of a millimeter. Wing measurements are taken by placing left forefinger at the bend of right wing so that the end of the rule, when placed under the wing, will just touch the finger. The tip of the longest primary is then indicated on the rule by the right thumbnail. Tail, bill, and tarsus measurements are taken in the same manner as that of the wing.

For weighing a balance has been used having a scale graduated to tenths of a gram. It has been necessary to do all weighing inside the house, as the slightest breeze affects the scale. The birds are weighed by putting them into a small bag and folding it around them. Most of them lie perfectly quiet. I have found it possible, when necessary, thus to band, measure, and weigh as many as twenty birds an hour.

Great care has been taken in the following list (Table I) to eliminate all birds with abraded primaries and rectrices. Sex has been determined, not by measurement, but by behavior or song when sexes are identical, with the exception of the Purple Finches, some of which, weighed as females, may have been immature males. The immature male Purple Finches given are all olivaceous birds coming into rosy plumage.

Birds marked "Juv." are fledglings ready to leave the nest, while young birds taken in traps are called immature.

Immature Myrtle Warblers were positively distinguished from adults by down feathers on the head, but those marked adults may have included some immature birds, as size or degree of coloring cannot be depended upon to determine age, some immature Myrtle Warblers, probably males, having more yellow and black than most adults. It is interesting to note that Myrtle Warblers taken late in the season were noticeably heavier than early arrivals. The average weight of 160 Myrtle Warblers from September 24th to October 2d was 11.17 grams, while the average of 114 Myrtle Warblers from October 8th to November 4th was 12.74 grams. It is presumed that these birds were feeding on the plentiful supply of bayberries near by and putting on weight to withstand the cold of the coming winter.

The average measurements of migrating Song Sparrows given will be seen to be larger and their weights greater than those of summer residents, which supports the opinion of some other banders working with Song Sparrows, that a larger race of these birds nests somewhere to the North. I feel sure that unusually full crops do not account for the greater weights, for two reasons: (1) such birds are also larger than my nesting birds and, (2) with perhaps one exception, they were passing hurriedly along in migration, as shown by the fact that only one repeated.

In an effort to determine whether feathers, bones, or bill shrink in drying, comparisons have been made of average measurements of live birds with those of skins as given by Ridgway in his "Birds of North and Middle America."

Comparisons of length are not given in the list (Table II), for such measurements of skins are of little value, as the specimen may have been stretched or shrunk a considerable amount.

Although Ridgway's material came from a much larger area than those birds measured by me, his skins are all from birds of the Eastern States and should not usually include races other than those with which I have worked.

In comparing skins with live birds it will be noticed in the list that tail-measurements of live birds are longer in nearly every case. This may be explained by the fact that all live birds measured had unabraded rectrices, and also that tails were measured from the oil-gland and not from the base of the rectrices as was done by Ridgway. The distance from the base of the rectrices to the oil-gland varying in different species accounts for variations in length.

The accordance of all measurements of Purple Finches is quite remarkable in view of the fact that nearly all other species vary a great deal.

The average measurements of *live* male Downy Woodpeckers are less than those of females. With skins, although the average tail of males is less, the wing is greater than that of females. This average wing-measurement of skins must be an error. The skins of White-breasted Nuthatch males are given as larger than those of females, while I have found exactly the opposite to be the case with the living bird. It must be remembered, however, that not a sufficient number of birds have been measured in either case to draw true averages.

Ridgway's seven male Tree Swallow wings average .5 mm. longer than those of twelve live males, while his six female wings were 1.3 mm. shorter than those of eighteen live females. Why the average tail of his same seven males should have averaged 2.9 mm. shorter than the average tail of the smaller winged twelve live males is hard to explain, although we should expect to find a 2.7 mm. shorter average tail for his shorter-winged females. The average tarsus of his males is 1.8 mm. longer than that of live males, which corresponds with the longer wing, but not with shorter tail; on the other hand, the 1.1 mm. longer tarsus of his females with shorter average wing and tail should not be so.

The average wing and tail of male House Wren skins is 1.4 mm. and 6.6 mm. respectively shorter than the live-male measurements, yet the average tarsus of the same skins is 1.2 mm. longer than the live males. And so on right through the

TABLE

Period	*Common Name*	*Scientific Name*	*Age*	*Sex*	*No of Inds.*	*Leng*	*Wing*
Sept. 21	Leach's Petrel	Oceanodroma l. leucorhoa	Ad.	..	1	198.75	158.75
Aug. 12	Eastern Green Heron	Butorides v. virescens	Im.	..	1	309.37	177.75
Aug.	Northern Red-shouldered Hawk	Buteo l. lineatus	Im	..	1	431.25	266.25
Mar. 22	Eastern Sparrow Hawk	Falco s. sparverius	Ad	♂	1	269.00	191.00
Sept. 18, Oct. 2	" " "	" " "	Ad.	♀	2	253.50–257.00	199.50 (19
May 15, Aug. 24	Eastern Bob-white	Colinus v. virginianus	Ad.	♂	2	215.50–222.00	118.25 (11
Aug. 4, July 29	" " "	" " "	Ad.	♀	2	209.25–212.00	116.75 (11
May, April 30	Virginia Rail	Rallus l. limecola	Ad.	..	2	187.00–234.75	115.50 (11
Nov. 17	Dovekie	Alle alle	Im.	..	1	184.00	107.75
Feb. 18, July 14	Eastern Mourning Dove	Zenaidura macroura carolinensis	Ad.	♀	2	266.25–276.50	147.25 (14
Feb. 6	Saw-whet Owl	Cryptoglaux a. acadica	Ad.	..	1	193.00	142.00
July 9	Eastern Whip-poor-will	Antrostomus v. vociferus	Im.	♀	1	298.50	146.00
June 10	Eastern Belted Kingfisher	Megaceryle a. alcyon	Ad.	♂	1	294.75	152.50
July 9–Aug. 10	Northern Flicker	Colaptes auratus luteus	Im.	..	6	260.25–274.50	150.00 (14
Oct. 13	Yellow-bellied Sapsucker	Sphyrapicus v. varius	Im.	..	1	198.75	123.50
Oct. 25–Jan. 18	Northern Downy Woodpecker	Dryobates pubescens medianus	Ad.	♂	3	152.50–165.00	96.00 (9
Nov. 6, Feb. 6	" " "	" " "	Ad.	♀	2	152.50–158.75	96.25
June 10–July 3	Eastern Kingbird	Tyrannus tyrannus	Ad.	..	3	177.75–199.50	114.50 (11
July 3	" "	" "	Juv.	..	1	136.75	76.25
June 10–July 30	Eastern Phœbe	Sayornis phoebe	Ad.	..	3	152.50–158.75	88.75 (8
July 8–Sept. 24	" "	" "	Im.	..	38	144.00–171.25	89.00 (8
July 22	" "	" "	Juv.	..	1	95.50	57.00
July 27, Aug. 1	Least Flycatcher	Empidonax minimus	Im.	..	2	120.00–130.25	63.50 (6
Feb. 18	Northern Horned Lark	Otocoris a. alpestris	Ad.	♂	1	174.00	111.50
June 11–July 13	Tree Swallow	Iridoprocne bicolor	Ad.	♂	12	127.00–148.75	124.25 (1
May 11–July 13	" "	" "	Ad.	♀	18	125.00–141.75	119.75 (1
Aug. 24	" "	" "	Im.	..	1	120.75	107.75
June 11, July 30	" "	" "	Juv.	..	2	82.50– 85.75	
Sept. 14–June 29	Northern Blue Jay	Cyanocitta c. cristata	Ad.	..	44	244.50–288.50	138.75 (13
Sept. 22–May 31	Black-capped Chickadee	Penthestis a. atricapillus	Ad.	..	58	113.00–132.00	70.00 (6
Oct. 20–Jan. 17	White-breasted Nuthatch	Sitta c. carolinensis	Ad.	♂	4	140.25–141.50	92.00 (9
Nov. 12, 20	" " "	" " "	Ad.	♀	2	139.50–141.00	93.25 (9
May 19–Aug. 15	Eastern House Wren	Troglodytes a. ædon	Ad.	♂	11	110.25–141.25	74.75 (7
May 20–Aug. 5	" "	" "	Ad.	♀	13	108.25–116.25	52.25 (4
July 20–Aug. 30	" " "	" " "	Im.	..	8	113.00–120.50	52.25 (4
June 23	" " "	" " "	Juv.	..	1	82.50	34.75
Jan. 30	Eastern Mockingbird	Mimus p. polyglottos	Ad.	♂	1	241.25	98.25
May 13–Oct. 6	Catbird	Dumetella carolinensis	Ad.	..	11	197.25–222.00	97.75 (9
July 12–Sept. 1	"	" "	Im.	..	43	118.00–214.75	117.75 (9
June 23	"	"	Juv.	..	1	129.50	59.00
July 4–Sept. 24	Brown Thrasher	Toxostoma rufum	Im.	..	8	237.00–264.00	104.50 (10
April 4–Aug. 21	Eastern Robin	Turdus m. migratorius	Ad.	♂	8	209.25–233.50	135.25 (1
May 25–Aug. 21	" "	" " "	Ad.	♀	8	212.50–236.50	129.00 (1
July 4–Sept. 6	" "	" " "	Im.	..	31	203.00–234.50	136.50 (1
May 29–Aug. 20	" "	" " "	Juv.	..	3	127.00–152.50	82.50 (8
June 12	Wood Thrush	Hylocichla mustelina	Ad.	..	1	184.00	107.75
Nov. 3	Eastern Hermit Thrush	Hylocichla guttata faxoni	Im.	..	1	177.75	93.75
July 21–26	Veery	Hylocichla f. fuscescens	Im.	..	3	165.00–171.25	93.25 (10
April 5–Oct. 13	Eastern Bluebird	Sialia s. sialis	Ad.	♂	10	152.50–160.50	113.50 (9
April 5–Oct. 13	" "	" " "	Ad.	♀	10	147.00–163.00	102.75 (9
July 16–Oct. 9	" "	" " "	Im.	♂	15	147.25–172.50	114.00 (10
July 16–Oct. 9	" "	" " "	Im.	♀	15	139.75–158.00	100.50 (9
Aug. 25	" "	" " "	Juv.	♂	1	113.50	73.00
Aug. 25	" "	" " "	Juv.	♀	1	103.00	68.00
July 17–23	Cedar Waxwing	Bombycilla cedrorum	Ad.	..	2	158.75–171.25	95.00 (9
July 17	" "	" "	Juv.	..	2	126.25	68.50 (6
Nov. 25	Northern Shrike	Lanius b. borealis	Im.	..	1	238.50	114.00
Nov. 29–Jan. 18	Starling	Sturnus v. vulgaris	Ad.	..	24	183.50–214.25	130.00 (1
July 4	Red-eyed Vireo	Vireo olivaceus	Ad.	♂	1	144.00	83.00
July 4	" "	" "	Ad.	♀	1	137.50	76.25
Aug. 11	" "	" "	Im.	..	1	140.00	81.50
July 4	" "	" "	Juv.	..	2	80.50– 83.00	
June 21–23	Black and White Warbler	Mniotilta varia	Ad.	♂	2	107.75–111.25	67.75
June 21–23	" " "	" " "	Ad.	♀	2	108.00–114.00	66.00 (6
June 21–23	" " " "	" "	Juv.	..	3	49.75– 66.50	38.50 (3
May 2, June 28	Eastern Yellow Warbler	Dendroica a. æstiva	Ad.	♂	2	105.00–111.00	67.25 (6
June 25, 27	" " "	" " "	Ad.	♀	2	98.25–117.50	63.25 (6
Aug. 21	" " "	" " "	Im.	..	1	114.00	63.25
June 25–28	" " "	" " "	Juv.	..	3	44.50– 69.75	35.50 (3
Sept. 24–Nov. 4	Myrtle Warbler	Dendroica coronata		..	274	111.50–147.25	76.25 (7
Oct. 14–22	" "	" "	Im.	..	66	124.25–137.00	78.00 (7

TABLE

Length	Wing	Tail	Exposed Culmen	Tarsus	Weight in Grams
198.75	158.75	85.75	16.00	22.25	37.40
398.5	177.75	67.00	50.75	50.75	119.10
431.25	266.25	203.00	24.00	76.25	....
249.5	191.00	127.00	12.50	35.50	87.75
3.50–237.50	169.50 (198.13)	127.00–130.00 (128.50)	9.75–12.25 (11.13)	31.75–32.25 (32.00)	111.30–115.20 (113.25)
5.50–222.50	118.25 (117.75)	67.00– 67.50 (67.25)	11.25–14.50 (12.88)	32.25–33.00 (32.63)	193.80–198.90 (196.35)
9.25–212.00	116.75 (116.00)	61.00– 68.50 (64.75)	11.75–14.50 (13.13)	28.00–30.50 (29.25)	206.80–207.30 (207.05)
7.00–234.75	115.50 (111.63)	44.00– 55.75 (49.88)	34.50–43.25 (38.88)	31.00–33.50 (32.25)	68.00
184.00	107.75	41.25	13.25	19.50	93.10
6.25–279.50	147.25 (145.75)	142.75–146.00 (144.38)	12.75–17.00 (14.88)	20.25–20.75 (20.50)	138.40
193.00	142.00	76.00	15.00	20.00	....
208.50	146.00	97.50	10.50	15.00	51.72
294.75	152.50	88.75	50.75	....	....
0.25–274.50	150.00 (145.71)	91.00–112.00 (101.88)	26.25–35.00 (28.79)	26.50–29.00 (27.21)	107.40–147.25 (116.33)
198.5	123.50	75.50	23.00	19.75	40.50
2.50–165.00	96.00 (95.09)	55.75– 68.50 (62.59)	13.25–15.75 (14.42)	14.00–16.50 (14.92)	26.80– 29.40 (28.10)
2.50–158.75	96.25	66.75– 70.25 (68.50)	14.00–17.00 (15.50)	14.00–16.50 (15.25)	21.45– 27.90 (24.68)
7.75–199.50	134.50 (113.75)	82.50– 86.50 (83.92)	11.50–16.25 (13.92)	15.50–19.50 (17.17)	28.88– 39.92 (35.60)
136.75	76.25	28.00	8.50	17.75	35.30
2.50–158.75	98.75 (85.17)	70.25– 75.50 (72.25)	11.75–13.75 (12.50)	16.00–20.25 (18.34)	16.50– 19.00 (17.59)
4.00–171.25	99.00 (84.83)	65.00– 82.50 (73.12)	11.25–16.50 (12.59)	16.00–19.00 (17.60)	15.60– 22.50 (18.69)
93.50	57.00	26.50	9.75	20.25	16.20
0.00–130.25	60.50 (62.25)	53.00– 53.75 (53.38)	9.25–12.25 (11.00)	15.00–16.00 (15.50)	9.24
174.50	111.50	75.00	9.75	23.50	....
7.00–148.75	124.25 (117.20)	52.25– 62.50 (58.55)	6.50– 7.75 (6.82)	8.25–12.75 (10.50)	18.98– 23.20 (20.58)
5.00–141.75	119.75 (115.84)	51.25– 60.25 (57.47)	5.50– 7.25 (6.51)	7.00–13.25 (11.13)	19.00– 24.70 (20.58)
120.25	107.75	46.50	7.00	12.75	19.60
2.50– 85.75	....	....	....	....	21.30– 22.00 (21.65)
4.50–288.50	139.75 (132.14)	86.50–149.25 (133.90)	19.00–27.25 (24.06)	31.75–37.50 (34.68)	80.00–103.40 (89.22)
3.00–132.00	70.00 (64.87)	57.25– 70.50 (63.47)	7.00– 9.25 (7.84)	11.50–19.00 (16.35)	9.40– 13.20 (11.11)
0.25–141.50	92.00 (90.63)	48.50– 53.75 (50.32)	17.00–19.75 (18.50)	17.75–18.75 (18.25)	22.00– 23.00 (22.44)
9.50–141.00	93.25 (91.75)	49.50– 54.50 (52.00)	16.50–17.50 (17.00)	17.25–18.50 (17.68)	20.80– 20.90 (20.85)
0.25–141.25	74.75 (52.18)	42.25– 72.75 (48.89)	10.75–13.13 (12.16)	14.75–18.75 (16.57)	10.00– 11.20 (10.55)
8.25–116.25	52.25 (49.67)	41.50– 46.00 (43.79)	11.25–13.75 (12.33)	12.50–17.25 (15.83)	10.58– 12.90 (11.72)
3.00–120.50	52.25 (50.84)	42.00– 45.75 (44.34)	10.50–12.25 (11.25)	15.00–18.50 (16.91)	9.60– 10.90 (10.38)
82.50	34.75	12.25	7.75	17.75	12.30
241.25	96.25	123.50	19.75	33.00	....
7.25–222.00	97.75 (91.64)	66.75–107.75 (95.50)	13.25–17.75 (16.02)	25.75–30.00 (27.75)	34.70– 44.40 (38.50)
8.00–214.75	117.75 (90.84)	67.75–108.00 (95.63)	11.75–19.75 (15.83)	22.50–30.50 (27.65)	32.30– 40.60 (36.04)
129.50	39.00	24.75	12.75	28.50	34.60
7.00–264.00	104.50 (100.63)	120.25–126.00 (123.03)	19.00–23.50 (21.33)	31.50–37.00 (33.94)	59.50– 76.90 (66.25)
9.25–233.50	135.25 (129.09)	94.50–112.00 (101.47)	17.25–20.75 (20.41)	30.50–34.50 (32.34)	73.00– 80.94 (77.20)
2.50–236.50	129.00 (125.21)	92.00–104.25 (97.49)	17.00–20.50 (18.25)	31.00–33.25 (31.84)	65.80– 84.09 (76.05)
3.00–234.50	136.50 (127.04)	81.25–108.50 (100.77)	15.25–21.50 (18.03)	28.50–35.00 (32.31)	63.20– 82.00 (72.49)
7.00–152.50	82.50 (77.08)	20.25– 33.00 (24.50)	12.00–14.00 (13.33)	30.00–30.50 (30.33)	50.70– 52.20 (51.44)
184.00	107.75	63.50	12.75	25.25	....
177.75	93.75	73.50	13.25	31.75	29.90
5.00–171.25	123.25 (106.63)	63.50– 76.25 (70.88)	13.50–15.25 (14.19)	26.50–32.50 (30.25)	31.70– 33.60 (32.47)
2.50–160.50	113.50 (98.00)	62.00– 70.50 (64.70)	10.25–13.25 (11.42)	19.00–21.50 (19.73)	27.60– 31.62 (29.98)
7.00–163.50	102.75 (96.73)	57.75– 89.50 (65.83)	10.25–14.25 (11.80)	17.25–20.25 (19.55)	27.78– 34.08 (29.23)
7.25–172.50	114.00 (102.85)	62.25– 70.25 (65.57)	10.00–12.00 (11.04)	16.25–20.25 (19.22)	25.50– 36.30 (30.98)
9.75–158.00	100.50 (95.47)	59.00– 65.25 (62.27)	9.75–12.00 (10.94)	16.75–20.25 (19.35)	27.40– 30.70 (29.79)
113.50	73.00	29.75	7.75	19.00	28.20
103.00	68.00	26.50	7.75	20.25	30.00
8.75–171.25	95.00 (94.88)	57.00– 57.50 (57.25)	8.50– 9.75 (9.13)	14.25–18.00 (16.13)	31.10
126.50	98.50 (68.00)	30.50– 32.25 (31.38)	7.75– 8.00 (7.88)	16.75–17.25 (17.00)	26.00– 27.10 (26.55)
238.50	114.00	111.50	16.25	26.00	57.50
3.50–214.25	130.00 (125.72)	58.25– 68.50 (64.47)	22.50–25.25 (24.16)	26.00–31.25 (29.12)	64.30– 88.80 (77.82)
144.00	93.00	62.50	13.50	17.50	17.48
137.00	76.25	52.00	12.75	18.00	15.98
140.00	81.50	54.25	12.00	17.50	17.78
80.50– 82.00	....	....	....	....	11.56– 13.66 (12.62)
7.75–111.25	67.75	44.50– 68.00 (56.25)	11.75–12.00 (11.88)	16.00–16.50 (16.25)	....
8.00–114.00	86.00 (64.75)	44.50– 50.75 (47.63)	11.75–12.75 (12.25)	16.50–17.50 (17.00)	....
9.75– 66.50	38.50 (34.42)	3.25– 6.50 (5.42)	8.00– 8.25 (8.17)	12.75–16.00 (14.92)	....
5.00–111.00	67.25 (62.75)	41.25– 49.25 (45.25)	9.75	19.00	....
8.25–117.50	63.25 (60.13)	38.00– 45.75 (41.88)	9.50–10.00 (9.75)	15.25–18.75 (17.00)	9.50
114.00	63.25	44.00	7.75	19.00	9.80
44.50– 66.75	35.50 (30.13)	1.75– 7.75 (4.75)	6.50– 7.75 (7.13)	15.25–18.00 (16.63)	....
11.50–147.25	76.25 (70.39)	50.25– 66.25 (56.43)	7.75–10.25 (8.77)	16.00–22.25 (18.46)	9.20– 16.40 (11.93)
24.25–137.00	78.00 (72.33)	52.50– 64.00 (58.93)	8.25–10.50 (9.14)	15.50–19.50 (17.79)	10.70– 14.90 (12.52)

TABLE 1—Contin

Period	Common Name	Scientific Name	Age	Sex	No. of Inds.	Leg	Wing
Aug. 2	Chestnut-sided Warbler	Dendroica pensylvanica	Ad.	♀	1	109.	60.75
Sept. 15, 17	Northern Pine Warbler	Dendroica p. pinus	Ad.	..	2	133.	76.25 (
Aug. 17–Sept. 5	Northern Prairie Warbler	Dendroica d. discolor	Im.	..	3	108.50–115.	58.00 (
Oct. 2	Yellow Palm Warbler	Dendroica palmarum hypochrysea		..	1	130.	63.50
July 14–Aug. 12	Ovenbird	Seiurus aurocapillus	Im.	..	6	127.00–143.	77.25 (
July 11	Northern Water-Thrush	Seiurus n. noveboracensis	Ad.	..	1	134.	71.00
July 11	Northern Yellow-throat	Geothlypis trichas brachidactyla	Ad.	♂	1	121.	59.75
July 29	" " "	" " "	Ad.	♀	1	130.	54.50
July 21–Sept. 7	" " "	" " "	Im.	..	20	115.25–128.	60.00 (
June 30	Bobolink	Dolichonyx oryzivorus	Ad.	♂	1	165.	95.00
June 30	"	" "	Ad.	♀	1	132.	82.50
June 30	"	" "	Juv.	..	1	76.	43.75
June 24	Eastern Meadowlark	Sturnella m. magna	Ad.	♀	1	203.	107.75
June 13	Eastern Red-wing	Agelæus p. phœniceus	Ad.	♀	1	190.	101.75
Aug. 3	" "	" "	Im.	..	1	202.	110.25
June 17–July 11	Baltimore Oriole	Icterus galbula	Ad.	♂	4	162.50–179.	98.75 (
May 22–Aug. 5	" "	" "	Ad.	♀	4	147.25–177.	95.00 (
July 12–Aug. 14	" "	" "	Im.	..	52	166.75–186.	98.00 (
June 22	" "	" "	Juv.	..	1	194.	56.00
Oct. 12	Rusty Blackbird	Euphagus carolinus	Ad.	♀	1	216.	115.25
Feb. 5	Bronzed Grackle	Quiscalus quiscula æneus	Ad.	..	1	320.	114.75
Feb. 10–Sept. 25	Eastern Cowbird	Molothrus a. ater	Ad.	♂	10	178.00–189.	118.00 (
Mar. 28–Sept. 25	" "	" "	Ad.	♀	10	157.50–174.	100.75 (
July 1–Sept. 24	" "	" "	Im.	..	16	151.50–183.	109.25 (
Aug. 21	Scarlet Tanager	Piranga erythromelas	Ad.	♀	1	172.	98.25
July 31	Rose-breasted Grosbeak	Hedymeles ludovicianus	Ad.	♀	1	180.	70.00
July 9–May 16	Eastern Purple Finch	Carpodacus p. purpureus	Ad.	♂	72	140.00–154.	88.00
July 1–May 17	" " "	" " "	Ad.	♀	148	123.50–152.	87.00
Mar. 20–Aug. 14	" " "	" " "	Im.	♂	19	136.50–149.	85.25
July 12–Aug. 14	" " "	" " "	Im.	..	23	134.50–146.	84.50
May 4–Sept. 22	Eastern Goldfinch	Spinus t. tristis	Ad.	♂	6	109.00–117.	73.00
July 17–Oct. 15	" "	" " "	Ad.	♀	5	114.00–119.	71.25
Aug. 26	" "	" " "	Juv.	..	1	83.	49.50
April 30–Oct. 2	Red-eyed Towhee	Pipilo e. erythrophthalmus	Ad.	♂	8	191.50–209.	93.75
May 14–Aug. 26	" "	" " "	Ad.	♀	6	183.50–198.	86.00
July 17–Oct. 8	" "	" " "	Im.	♂	12	118.50–203.	89.00
July 25–Oct. 7	" "	" " "	Im.	♀	12	184.00–205.	85.75
April 17–Oct. 29	Eastern Savannah Sparrow	Passerculus sandwichensis savanna	Ad. & Im.	..	82	120.00–149.	76.50
July 5–Oct. 25	Eastern Grasshopper Sparrow	Ammodramus savannarum australis	Ad.	..	4	117.00–127.	64.00
July 16–Sept. 24	Eastern Grasshopper Sparrow	Ammodramus savannarum australis	Im.	..	14	103.00–121.	64.00
April 22–Oct. 22	Eastern Vesper Sparrow	Poœcetes g. gramineus	Ad.	..	20	133.50–153.	85.75
Oct. 1–April 29	Slate-colored Junco	Junco h. hyemalis	Ad.	..	171	127.00–156.	87.50
Oct. 29–April 24	Eastern Tree Sparrow	Spizella a. arborea	Ad.	..	48	140.50–158.	81.25
April 23–Oct. 23	Eastern Chipping Sparrow	Spizella p. passerina	Ad.	..	97	112.50–145.	73.00
July 11–Oct. 22	" " "	" " "	Im.	..	102	103.50–133.	73.25
July 3–17	" " "	" " "	Juv.	..	5	61.50– 82.	48.25
April 16–Oct. 2	Eastern Field Sparrow	Spizella p. pusilla	Ad.	..	22	119.00–139.	65.00
July 19–Sept. 25	" " "	" " "	Im.	..	18	119.50–139.	66.75
May 14, Oct. 8–13	White-crowned Sparrow	Zonotrichia l. leucophrys	Ad.	..	7	155.00–173.	81.25
Oct. 1–Nov. 1	" " "	" " "	Im.	..	20	155.50–166.	83.25
April 22–May 6	White-throated Sparrow	Zonotrichia albicollis	Ad.	..	4	151.75–163.	78.25
Sept. 26–Nov. 25	" " "	" " "	Im.	..	376	143.75–169.	79.25
Mar. 21–April 21	Eastern Fox Sparrow	Passerella i. iliaca	Ad.	..	16	161.65–176.	93.50
Oct. 24–Nov. 13	" " "	" " "	Im.	..	37	158.75–177.	93.50
Sept. 24–Oct. 10	Lincoln's Sparrow	Melospiza l. lincolni	Im.	..	9	129.50–142.	65.00
April 29	Swamp Sparrow	Melospiza georgiana	Ad.	..	1	139.	63.50
July 27–Oct. 23	" "	" "	Im.	..	30	129.50–147.	66.75
April 15–Aug. 30	Eastern Song Sparrow	Melospiza m. melodia	Ad.[1]	♂	34	134.50–167.	70.75
May 7–Sept. 14	" " "	" " "	Ad.[1]	♀	21	136.50–153.	63.50
Mar. 13–30	" " "	" " "	Ad.[2]	..	39	145.00–158.	72.00
Sept. 23–Nov. 11	" " "	" " "	Ad. & Im.[2]	..	81	136.50–159.	72.00
June 24–Sept. 5	" " "	" " "	Im.[1]	..	121	127.00–156.	68.00
July 25	" " "	" " "	Juv.	..	1	83.	45.75

[1] Summer residents.

[2] Spring migrants.

[3] Fall mi

Wing	Tail	Exposed Culmen	Tarsus	Weight in Grams
60.75	34.00	12.00	17.00	....
76.25 (73.13)	55.75– 57.00 (56.38)	11.75–12.75 (12.25)	16.50	....
58.00 (56.09)	46.00– 51.00 (49.17)	9.25– 9.50 (9.42)	15.50–18.50 (17.34)	5.92– 8.02 (7.16)
63.50	58.25	9.75	19.00	....
77.25 (76.41)	52.00– 59.75 (54.88)	10.75–12.75 (11.79)	20.00–23.00 (21.71)	19.18– 22.70 (20.44)
71.00	49.75	12.00	21.75	15.90
59.75	55.00	12.00	18.50	9.72
54.50	50.75	9.50	20.50	10.00
60.00 (56.50)	45.75– 56.00 (50.92)	9.75–11.75 (10.75)	18.00–21.50 (19.83)	8.90– 12.60 (10.44)
95.00	66.00	14.00	22.75	....
82.50	54.00	12.75	21.00	....
43.75	9.50	11.00	22.00	....
107.75	75.50	31.75	34.25	....
101.75	77,50	16.00	29.00	....
110.25	88,25	17.00	29.75	....
98.75 (95.57)	71.75– 77.75 (75.32)	17.75–20.25 (18.57)	21.25–22.75 (22.13)	31.40– 36.10 (33.64)
95.00 (85.07)	69.75– 76.75 (73.88)	15.75–17.75 (16.75)	19.00–25.25 (22.98)	35.30– 37.70 (36.50)
98.00 (89.53)	67.00– 85.75 (72.95)	11.75–19.75 (16.45)	21.00–25.75 (23.15)	26.88– 39.98 (32.60)
56.00	19.00	12.00	21.75	....
115.25	96.25	19.50	32.25	....
114.75	137.25	24.00	36.75	152.52
118.00 (112.30)	70.75– 79.00 (75.98)	15.00–23.00 (16.74)	24.25–26.50 (25.35)	44.54– 49.20 (47.69)
100.75 (96.80)	63.50– 97.50 (67.78)	12.00–14.25 (13.38)	22.25–25.75 (24.13)	31.40– 38.00 (35.63)
109.25 (100.91)	61.25– 75.50 (68.02)	12.25–16.00 (14.16)	22.50–26.50 (24.69)	29.02– 46.40 (37.81)
99.25	71.00	14.25	19.25	28.90
70.00	72.75	16.50	23.75	37.50
88.00 (83.44)	54.25– 62.75 (59.71)	9.50–12.00 (10.64)	15.25–19.00 (17.17)	20.40– 29.98 (25.86)
87.00 (80.52)	35.25– 62.50 (56.27)	9.25–12.00 (10.57)	15.00–20.25 (17.04)	20.00– 31.29 (24.60)
83.25 (81.27)	52.00– 62.00 (57.39)	9.50–11.25 (10.39)	15.50–19.50 (17.31)	22.00– 27.36 (24.37)
84.50 (80.52)	54.00– 60.25 (56.13)	9.50–14.00 (10.25)	13.50–18.75 (17.20)	17.50– 23.52 (20.98)
78.00 (71.50)	45.75– 49.75 (46.55)	8.00–10.00 (9.30)	11.50–13.75 (13.00)	11.40– 13.30 (12.15)
71.25 (69.68)	44.50– 49.25 (46.80)	9.00– 9.75 (9.30)	12.00–14.50 (13.50)	11.32– 14.70 (12.85)
49.50	17.50	7.00	13.50	11.40
93.75 (88.29)	84.25–113.50 (97.60)	12.50–14.50 (13.16)	25.50–29.25 (28.16)	37.12– 46.80 (41.97)
86.00 (82.85)	73.75– 93.50 (86.40)	12.00–14.00 (12.70)	26.00–29.50 (27.40)	30.00– 43.70 (39.30)
89.00 (86.69)	93.00– 97.00 (95.23)	11.75–13.50 (12.30)	26.25–37.00 (28.59)	34.90– 45.90 (40.33)
83.75 (82.13)	88.75– 95.25 (91.62)	11.25–13.00 (12.19)	24.25–28.50 (27.32)	34.70– 47.40 (39.20)
76.50 (69.44)	47.50– 64.00 (53.27)	7.75–11.75 (9.04)	18.25–23.00 (20.69)	15.00 – 25.04 (18.73)
64.00 (61.82)	44.25– 47.00 (45.19)	11.00–12.25 (11.44)	19.00–20.25 (19.32)	17.53– 17.80 (17.67)
64.00 (59.31)	38.25– 45.25 (41.34)	9.25–11.25 (10.24)	17.25–20.75 (19.59)	14.00– 18.30 (16.09)
83.75 (80.05)	58.25– 71.00 (62.65)	9.25–11.50 (10.20)	19.50–21.75 (20.39)	22.10– 27.50 (24.23)
87.50 (76.99)	60.00– 74.50 (67.47)	7.75–11.25 (9.68)	17.50–23.00 (20.41)	16.00– 26.47 (20.94)
81.25 (75.96)	63.00– 75.00 (70.10)	8.00–10.00 (9.10)	18.75–22.50 (20.51)	17.40– 22.38 (19.59)
73.00 (69.05)	48.50– 64.75 (57.68)	6.75– 9.75 (8.21)	13.00–18.75 (16.54)	10.30– 16.70 (12.53)
73.25 (68.41)	45.00– 66.00 (58.13)	7.25– 9.75 (8.18)	14.50–20.00 (17.03)	10.30– 14.30 (12.01)
48.25 (46.25)	20.25	6.50	16.25–17.75 (17.00)	9.00– 10.90 (9.94)
65.00 (62.35)	52.00– 68.50 (63.40)	7.50– 9.00 (8.18)	16.00–19.25 (17.65)	10.60– 14.40 (12.57)
66.75 (63.31)	58.25– 69.50 (64.13)	7.75– 9.25 (8.32)	17.00–19.25 (18.12)	10.50– 14.60 (12.39)
81.25 (78.65)	69.00– 81.50 (75.04)	9.75–10.75 (10.11)	21.50–24.00 (22.65)	25.20– 35.75 (31.27)
93.25 (76.85)	68.50– 79.25 (74.43)	9.50–12.25 (10.32)	20.50–24.50 (23.07)	23.02– 32.50 (28.67)
78.25 (75.07)	73.00– 75.00 (74.25)	10.00–10.50 (10.25)	21.50–23.00 (22.13)	24.20– 29.62 (27.26)
79.25 (72.92)	50.75– 80.00 (73.22)	9.50–12.75 (10.17)	17.75–25.75 (23.28)	18.20– 34.50 (26.99)
93.50 (89.43)	71.50– 79.25 (75.38)	10.25–13.00 (11.22)	22.00–25.00 (23.75)	29.59– 47.38 (40.28)
93.50 (85.30)	67.75– 77.50 (73.23)	9.75–12.25 (11.09)	22.25–26.50 (24.71)	34.90– 52.10 (40.00)
65.00 (60.73)	55.00– 64.50 (57.45)	8.75–10.50 (9.67)	18.50–21.50 (19.89)	14.40– 19.28 (16.90)
63.50	64.75	9.50	20.25	....
66.75 (61.35)	56.00– 64.50 (59.81)	8.50–11.00 (9.79)	19.75–24.00 (21.77)	14.20– 21.50 (17.61)
70.75 (67.00)	59.00– 74.75 (67.56)	9.75–13.00 (11.25)	19.50–22.75 (21.03)	19.90– 24.80 (21.80)
63.50 (61.70)	57.00– 71.00 (62.61)	9.75–13.25 (11.24)	18.75–22.50 (20.65)	17.70– 24.20 (19.84)
72.00 (67.56)	65.00– 76.75 (69.46)	10.25–12.00 (10.90)	19.50–23.50 (21.19)	20.01– 28.00 (24.01)
72.00 (65.98)	57.50– 77.00 (67.81)	9.75–12.25 (10.58)	17.75–23.75 (21.42)	18.28– 25.60 (21.91)
68.00 (64.04)	49.50– 73.50 (64.87)	7.75–13.25 (10.54)	19.25–23.75 (21.25)	16.20– 23.50 (19.68)
45.75	12.75	9.50	22.25	15.20

All measurements in millimeters.

TABLE II

	Common Name	*Scientific Name*	*Age*	*Sex*	*No. of Inds.*	*Locality from Which Birds were Taken*	*Wing*	*Tail*	*Exposed Culmen*	*Tarsus*
Ridgway	Northern Downy Woodpecker	Dryobates pubescens medianus	Ad.	♂	3	Eastern Mass.	97.5	57.2	16.5	15.8
Wetherbee	" " " "	" " "	"	♂	3	Mass. and Conn.	95.	62.5	14.4	14.9
Ridgway	" " " "	" " "	"	♀	3	Eastern Mass.	96.5	59.8	15.7	15.8
Wetherbee	" " " "	" " "	"	♀	2	Mass. and Conn.	96.2	68.5	15.5	15.2
Ridgway	Tree Swallow	Iridoprocne bicolor	"	♂	7	Eastern U. S.	118.4	55.6	6.9	12.3
Wetherbee	" "	" "	"	♂	12	Mass. and Conn.	117.9	58.5	6.8	10.5
Ridgway	" "	" "	"	♀	6	Eastern U. S.	114.5	54.7	6.4	12.2
Wetherbee	" "	" "	"	♀	18	Mass. and Conn.	115.8	57.4	6.5	11.1
Ridgway	White-breasted Nuthatch	Sitta c. carolinensis	"	♂	7	Mass. to Minn.	92.3	48.8	19.4	19.1
Wetherbee	" " "	" " "	"	♂	3	Mass. and Conn.	90.7	50.1	17.9	17.5
Ridgway	" " "	" " "	"	♀	10	Mass. to Nebraska	88.9	46.6	18.4	18.4
Wetherbee	" " "	" " "	"	♀	2	Mass. and Conn.	91.7	52.	17.	17.6
Ridgway	Eastern House Wren	Troglodytes a. aëdon	"	♂	10	Eastern U.S. and Canada	50.7	42.2	12.4	17.7
Wetherbee	" " "	" " "	"	♂	11	Mass. and Conn.	52.1	48.8	12.1	16.5
Ridgway	" " "	" " "	"	♀	6	Eastern U.S. and Canada	50.2	41.3	12.2	17.4
Wetherbee	" " "	" " "	"	♀	13	Mass. and Conn.	49.6	43.7	12.3	15.8
Ridgway	Eastern Robin	Turdus m. migratorius	"	♂	10	Eastern & northern N.A.	134.3	102.2	20.1	33.1
Wetherbee	" "	" " "	"	♂	8	Mass. and Conn.	129.	101.4	20.4	32.3
Ridgway	" "	" " "	"	♀	2	Eastern & northern N.A.	127.2	94.7	20.5	32.
Wetherbee	" "	" " "	"	♀	8	Mass. and Conn.	125.2	97.4	18.2	31.8
Ridgway	Eastern Bluebird	Sialia s. sialis	"	♂	10	D. C. to N. H.	100.6	63.6	11.9	20.
Wetherbee	" "	" " "	"	♂	10	Mass. and Conn.	98.	64.7	11.4	19.7
Ridgway	" "	" " "	"	♀	10	D. C. and Maryland	96.7	60.2	12.	19.8
Wetherbee	" "	" " "	"	♀	10	Mass. and Conn.	96.7	65.8	11.8	19.5
Ridgway	Baltimore Oriole	Icterus galbula	"	♂	6	Atlantic States	97.	77.	18.	23.9
Wetherbee	" "	" "	"	♂	4	Mass. and Conn.	95.5	75.3	18.5	22.1
Ridgway	" "	" "	"	♀	4	Atlantic States	88.1	68.6	17.5	22.9
Wetherbee	" "	" "	"	♀	4	Mass. and Conn.	85.	73.8	16.7	22.9
Ridgway	Eastern Cowbird	Molothrus a. ater	"	♂	10	East of Great Plains	109.5	74.7	18.	26.4
Wetherbee	" "	" " "	"	♂	10	Mass. and Conn.	112.3	75.9	16.7	25.3
Ridgway	" "	" " "	"	♀	10	East of Great Plains	97.	66.	15.7	24.9
Wetherbee	" "	" " "	"	♀	10	Mass. and Conn.	96.8	67.7	13.3	24.1
Ridgway	Eastern Purple Finch	Carpodacus p. purpureus	"	♂	15	Eastern N. A.	83.31	58.67	11.18	17.78
Wetherbee	" " "	" " "	"	♂	72	Mass. and Conn.	83.44	59.71	10.64	17.17
Ridgway	" " "	" " "	"	♀	15	Eastern N. A.	80.26	—	10.92	17.78
Wetherbee	" " "	" " "	"	♀	148	Mass. and Conn.	80.52	56.27	10.57	17.04
Ridgway	Eastern Goldfinch	Spinus t. tristis	"	♂	9	Atlantic Coast States	73.41	48.01	10.16	13.46
Wetherbee	" "	" " "	"	♂	6	Mass. and Conn.	71.50	46.55	9.30	13.00
Ridgway	" "	" " "	"	♀	9	Atlantic Coast States	68.58	43.69	9.91	13.97
Wetherbee	" "	" " "	"	♀	5	Mass. and Conn.	69.68	46.80	9.30	13.50
Ridgway	Red-eyed Towhee	Pipilo e. erythrophthalmus	"	♂	9	East of Alleghenies	89.92	94.74	14.22	28.45
Wetherbee	" " "	" " "	"	♂	8	Mass. and Conn.	88.29	97.60	13.16	28.16
Ridgway	" " "	" " "	"	♀	7	East of Alleghenies	81.03	85.85	13.97	26.92
Wetherbee	" " "	" " "	"	♀	6	Mass. and Conn.	82.85	86.40	12.70	27.40
Ridgway	Eastern Song Sparrow	Melospiza m. melodia	"	♂	13	Atlantic Coast	66.55	65.28	12.45	22.10
Wetherbee	" " "	" " "	"	♂	34	Mass. and Conn.	67.20	68.15	11.25	21.01
Ridgway	" " "	" " "	"	♀	12	Atlantic Coast	64.52	64.52	12.45	21.34
Wetherbee	" " "	" " "	"	♀	21	Mass. and Conn.	61.70	62.61	11.24	20.65

list we find tarsi averages, and frequently bill averages too, given somewhat longer than those of live birds. Were it *vice versa*, we should expect that bill and tarsi had shrunk in drying. But I am unable to account for these longer bill and tarsi of skins.

The discrepancy in wing-measurements is particularly noticeable. But, to quote from Ridgway, "determination of sex by collectors is not always to be relied on, measurements of one sex sometimes almost certainly figuring among those of the other." This is readily seen in the Song Sparrow measurements in the list, upon which perhaps more work has been done than upon any other species. As measurements of nesting live Song Sparrows alone are given, and sex absolutely determined by song or behavior, and as also a greater number of live birds than of skins has been measured, it is reasonable to assume that average measurements of live birds in this case are far more accurate than those given by Ridgway.

As the list of average measurements of skins and live birds is studied and comparisons are made, more and more apparent to the bird-student are the inadequateness and inequality of such a list. One cannot help but marvel at the vast amount of work done by Ridgway. However, comparisons of measurements taken from skins and live birds, even made in a small way, prove, to the writer at least, the errors evident in measurements of skins. That more banders, especially those banding quantities of birds, will become interested in obtaining measurements and also weights of all birds banded, is the sincere hope of the writer.

The average measurements and weights of 34 nesting male Song Sparrows in comparison with 34 migrant Song Sparrows, regardless of sex, is: length, nesting males 150.90 mm., migrants 154.01 mm.; wing, nesting males 67.20 mm., migrants 68.21 mm.; tail, nesting males 68.15 mm., migrants 70.27 mm.; bill, nesting males 11.25 mm., migrant 10.88 mm.; tarsus, nesting males 21.01 mm., migrants 21.53 mm.; weight, nesting males 21.97 grams, migrants 25.35 grams. On account of the length of wing of these migrants they would all be considered males, and so I have compared them with nesting males, though I believe that both sexes are included in the migrants, and that average measurements of males alone would have been larger. The 34 migrant Song Sparrows included 23 spring migrants and 11 fall migrants. The wing, tail and length measurements of fall migrants, on account of unabraded plumage, are naturally greater than the spring measurements,

but as two-thirds of the birds were spring migrants, it is believed that the average is as nearly true as can be. Then, too, no measurements of nesting males with noticeably worn plumage were given, as stated above.

The measurements of migrants very likely include some individuals nesting only a little way to the north and thus the averages would be too low for a northern race if it exists.

THE OPPORTUNITY OF BIRD-BANDING

By MARGARET MORSE NICE

WE now have a means of studying wild birds undreamed of a few years ago. In the first place we can actually handle our subjects. In the second place by means of both colored and aluminum bands we can follow the activity of known individuals in freedom throughout a season or perhaps for years.

Yet too many bird-banders have not progressed beyond the earliest stage—before the invention of traps or colored bands—apparently believing that banding is merely a means of studying migration. So they capture as many birds as they possibly can, simply attaching the numbered band and that is the last they see or hear of the vast majority of their subjects.

Important as banding a large number of birds is, banders could add greatly to our knowledge of bird-life if they would also study a few birds carefully.

Two things are necessary if we are going to make adequate use of our opportunities: first, a clear idea of problems to be studied; second, a knowledge of what others are doing.

THE BIRD IN THE HAND

Every bird captured should be carefully examined and its sex and age determined if possible. Wing and tail measurements often serve as indices of sex (Nice, '32). In the nesting season the incubation patch should be looked for; its presence or absence may tell the bird's sex, or perhaps give us new information as to the habits of the species, since the share of the sexes in incubation is not certainly known with many even of our common birds. The gradual appearance of these bare spots should be studied in relation to the laying of the eggs.

Sometimes young birds have pointed tail-feathers in contrast to rounded feathers in adults. In the Song Sparrow

(*Melospiza melodia beata*) this has proved true with the males, but in the females the feathers are more or less pointed regardless of age.

Every bird should be weighed at every capture, the time of day being noted, and temperature also, as it has been found that some birds weigh more during a cold spell than in a warm one. Some species gain in fall, some in winter, and some in spring, while others remain practically stationary throughout the year. In some species females average higher than males during the nesting season. Is this merely a matter of the developing eggs, or do the birds put on fat in anticipation of the incubation period? When one finds during the nesting season a female Song Sparrow weighing 24 grams instead of the usual 20, or a female Cowbird (*Molothrus ater ater*) weighing 45 instead of 38 grams, then one knows that this particular bird is in the midst of laying a clutch of eggs.

There are many interesting questions in regard to molt: the weight of the bird during this time; the duration of the process; its relation to breeding and migration; the time of its onset in relation to sex, climatic conditions, the individuality of the bird, etc., etc.

"The colors of the eyes, bill, legs, and feet, and also cere, lores, and eyelids, which are naked in some species, change frequently in color from youth to maturity or with the seasons," wrote Forbush ('27). The color of the lining of the mouth and tongue should be noted, especially in young birds.

In much of this detailed work indoors the significance of the observations made depends on a recognition of the individual outdoors, also on a full knowledge of the status of its family affairs.

Field Study of Birds

For the field study of birds it is essential to use colored bands. The results of much good work in the past have been vitiated by the impossibility of absolute identification of the individual bird. Now at last we are ready to proceed on sure ground.

To catalog the different problems under life-history studies would demand a long treatise. Every bird-bander should diligently peruse the excellent list at the end of the "Manual" (Lincoln and Baldwin, '29). I shall confine myself to a few suggestions along lines which I have found particularly fruitful.

The question of territory is very much to the fore at present. Which birds are true territory-holders and which are not?

What is the purpose of territory? (See reviews in this number of *Bird-Banding.*)

The matter of song can be satisfactorily studied only in birds individually known. The relation of song to weather, time of year, nesting cycle, age of the singer—all these are important questions. Little has been done on studying the development of song, or the subject of the singing of the female. In which species does the male stop singing on the arrival of a mate, and when does he begin to sing again?

There are many important problems connected with the study of eggs which can only be answered with birds that are marked. Some of these questions concern: the time of beginning to lay; number of eggs in a set; number of sets ordinarily laid and greatest number possible; color in a set and in different individuals; size of eggs in different individuals, in the same set, in succeeding sets, in succeeding years; shape of the eggs; inheritance of color, size, and shape.

How are these phenomena influenced by the following factors?

(1) Factors in the bird herself: age, inheritance, individuality.

(2) External factors: increasing and decreasing light, temperature, precipitation; food; disturbances of all kinds, in the territorv. or through Cowbird activities.

THE LITERATURE

The most fruitful source of suggestions for our own problems lies in the well-planned, well-organized researches of other investigators. It is impossible to do the best work without a fair idea of what others have done. Yet the task of keeping abreast of the literature of one's subject grows increasingly difficult with the ever-growing array of articles that appear.

There are two major attempts to catalog the zoölogical articles of the world—the "Zoölogical Record" in England and "Biological Abstracts" in this country.

The "Zoölogical Record," now in its sixty-ninth year, lists the articles by authors, giving title and reference. For 1932 there are 1385 entries under "Aves." Next there is a subject-index where the articles are arranged under all sorts of topics —migration, nidification, courtship, physiology, geography, etc., etc. Finally there is the systematic index with the articles arranged under each species. It will be seen that the "Zoölogical Record" is a reference-source of great importance. It should be available in every large library. The section on

Aves may be purchased separately for seven shillings, six pence.

"Biological Abstracts" is a much more recent enterprise, having just completed its eighth year. As its name denotes, a brief account of the contents of each article is given. The papers under "Aves" are arranged under the following topics: General or Popular; Systematic; Life History; and Local or Faunistic. References are also given to other bird papers abstracted under "Ecology" and other subjects. There is much valuable material in "Biological Abstracts," but owing to lack of funds it is not up to date, articles of 1930 and 1931 being in the majority at the end of 1933. It should be found in all colleges and in large general libraries.

Those bird-students who read German will find good reviews in *Vogelzug*, a quarterly journal with an excellent index at the end of each year, covering both original and reviewed material in the fields of banding, migration, and life-history.

Beiträge zur Fortpflanzungsbiologie der Vögel—a bi-monthly devoted entirely to life history studies—also carries good reviews and abstracts of books and articles in this field.

The problem, of course, after one has found a reference, is to get hold of the article. If the journal is not in the library, it may be that the library will borrow it for the investigator. Or perhaps a reprint may be obtained from the author.

It has been planned in *Bird-Banding* to review the literature with the purpose of giving the greatest possible help to banders —to suggest problems and to give some definite facts that have been found by others. The usefulness of this department will depend on the support given to this journal. The larger the subscription list, the more space can be allotted to reviews.

COÖPERATIVE STUDY

Although much good work is being done individually in life-history studies, there are many general problems in bird biology that can be better handled coöperatively.

Stevens ('32) after suggesting a number of subjects for research connected with "The problem of the return of the young birds," hopes "that such material can be brought together from many sources and combined into a few comprehensive reports rather than be published in a large number of short notes by individual workers. Coöperative effort should result in better work as well as better presentation for those who may wish to read of it during later years."

The fine results of "Coöperative Ornithology" are sum-

marized by McCabe (33b), who describes the "Report of Bird Migration in the Mississippi Valley," and nesting and wildfowl censuses in this country, and the "Census of British Heronries" and the "Great Crested Grebe Inquiry" in Great Britain. The Indiana Audubon Society organizes the efforts of banders in that State and has published reports on the migration of several Indiana-breeding birds (Perkins, '32; Test '33).

Fields in which coöperation is especially called for are population and migration studies, studies on particular species, and keeping track of the literature.

Under population studies a number of problems suggest themselves: censuses; return of adults to breeding place; return of young to birthplace; percentage of immature birds in the fall; percentage of first-year birds in the breeding population; success of nests; sex ratio; longevity, etc., etc.

Under migration problems there are the questions of the winter quarters, the migration route, the migratory or stationary status of each population of breeding birds, the great and difficult questions of migration and weather, and many, many other subjects of importance.

As to the study of species, could not people that are specializing on a particular bird club together to help one another—possibly one of them going to Washington to work up the data in the files of the Biological Survey—and then finally write a joint report?

As to the means of working out this scheme of coöperative research, I would suggest a central committee composed of Mr. Lincoln, Mr. Whittle, and representatives from the four regional bird-banding associations, with subcommittees each with a rather definite problem to solve.

In conclusion, let me quote from McCabe's ('33a) discussion of banding: "The most delightful of occupations, with a world of human and scientific good to its credit, its ultimate justification lies in its concrete scientific value and nothing else."

We have a great opportunity and a definite responsibility. There is nothing in the world so rewarding as the discovery of truth. Let us plan our efforts so as to make the most of our opportunity.

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THE MIGRATORY MOVEMENTS OF CERTAIN COLONIES OF HERRING GULLS IN EASTERN NORTH AMERICA

By RICHARD JEFFERSON EATON

PART III.

THE GREEN BAY (WISCONSIN) COLONIES

IN U. S. Technical Bulletin 32, U. S. Department of Agriculture, pages 10 and 11, Mr. F. C. Lincoln has listed the following thirty-three recoveries from birds banded from 1923 to 1926 in "Green Bay Region," Wisconsin. No precise locations of the banding stations are given, although it is suspected that they were at Hat and Sister Islands, Door County, where Mr. W. I. Lyon and others have been working for several years.

THE GREEN BAY (WISCONSIN) COLONIES

Date of Banding	*Band No. of Recovery*	*Place of Recovery*	*Date of Recovery*	*Age of Gull Recovered*	*Air-Line Distance from Banding Station*[1]
7/ 8/26	377484	Manistee, Mich.	9/12/26(?)	1st year	80-E
7/11/26	377712	Arcadia, Mich.	9/12/26	" "	80-E
7/19/24	320136	Egg Harbor, Wis.	9/13/24	" "	15-S
7/ 9/26	336332	Munising, Mich.	9/17/26	" "	100-N
7/ 8/26	421118	Wainfleet, Long Beach, Ont.	9/19/26	" "	400-ESE
7/18/24	320043	Escanaba, Mich.	9/21/24	" "	75-N
7/22/26	377242	Beach Haven, N. J.	9/22/26	" "	750-SE
7/ 9/26	336486	Port Clinton, Ohio	9/26/26	" "	350-SE
7/ 6/25	336078	Two Rivers, Wis.	9/30/25	" "	80-S
7/ 9/26	336253	Orillia, Ont.	10/ 1/26	" "	375-E
7/18/24	208039	Empire, Mich.	10/ 6/24	" "	70-E
7/ 8/26	377392	Sturgeon Bay, Wis.	10/11/26	" "	30-S
7/ 8/26	377440	Green Island Light Station, Wis.	10/11/26	" "	?
7/ 8/26	377042	Algoma, Wis.	10/18/26	" "	50-S
7/20/24	320168	Baileys Harbor, Wis.	10/25/24	" "	10-S
7/18/24	320104	Au Train, Mich.	11/—/24	" "	100-N
7/ 8/26	377416	Marinette, Wis.	11/ 3/26	" "	20-SW
7/ 8/26	377392	Sheboygan, Wis.	11/20/26	" "	110-S
7/ 9/26	336195	Oswego, N. Y.	11/20/26	" "	600-ESE
7/ 9/26	336069	Put in Bay, Ohio	12/19/26	" "	350-SE
7/ 8/26	337229	San Bernard River, Texas	12/22/26	" "	1250-S
7/19/24	320120	Lumberton, Miss.	12/22/24	" "	1000-S
7/ 8/26	377254	Walnut Lake, Ark.	12/24/26	" "	850-S
7/ 9/26	336111	Newellton, La.	12/25/26	" "	950-S
7/18/24	320080	I(a)monia Lake, Fla.	12/26/24	" "	1050-S
7/ 8/26	377455	New Iberia, La.	12/26/24	" "	1100-S
6/25/24	236173	Venice, Ill.	12/31/24	" "	475-S
7/ 6/25	336043	Cape Lookout, N. C.	1/11/26	" "	925-SE
6/25/24	236184	Milwaukee, Wis.	1/13/25	" "	160-S
6/25/24	236207	Port Washington, Wis.	3/21/25	" "	135-S
7/17/24	200041	Beaumont, Texas	4/ 7/25	" "	1150-S
6/25/24	236198	New River, Tenn.	5/12/25	" "	650-SSE
7/20/24	320152	Seaside Park, N. J.	8/ 8/25	2d year	750-SE

[1]Numerals indicate miles. The letters are abbreviations of the points of the compass.

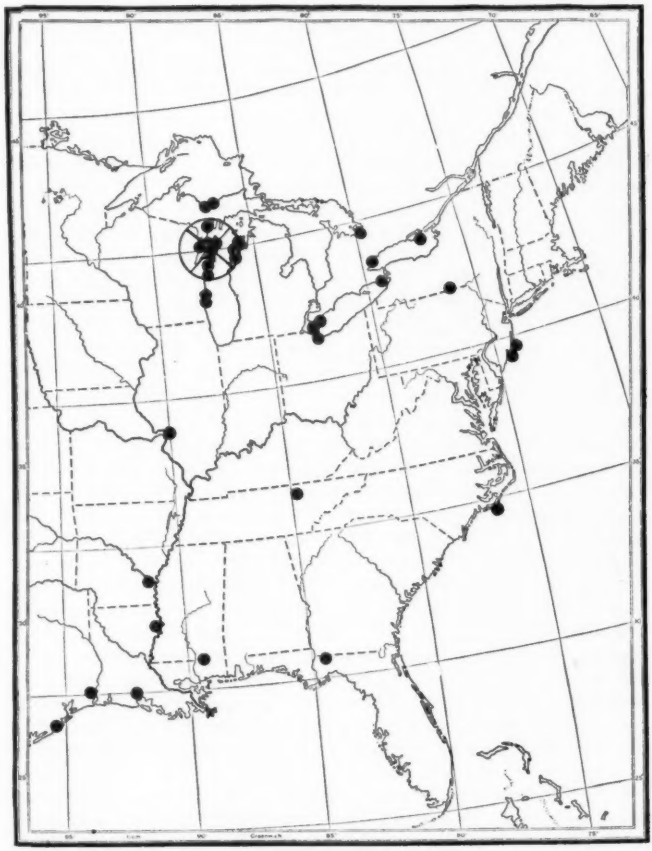


Figure 8. Map showing the distribution of first-year recoveries (and one second-year) from the Green Bay, Wisconsin, Colonies. The location of banding station is at the center of the large circle.

In addition to the foregoing recoveries, about twenty-one others dated from 1927–1930 have been published from time to time in the *Canadian Field Naturalist*. Unfortunately Canadian records only were listed, thus rendering them nearly useless for analytical purposes. Obviously the value of a relatively small amount of data as the basis of generalizations is almost entirely destroyed by the intrusion of any artificial factors such as geographical selection. By the doctrine of chances certain probable truths may be deduced from a small number of events, if such events are chosen at random. By considering *all* the reported recoveries from a given colony over a given period of time we obtain a fair random sample from which to develop a thesis.

Before we dismiss the *Canadian Field Naturalist* data, however, certain features of interest should be pointed out. If the list is a substantially complete record of all Canadian recoveries reported during a given period of time, then the proportion of first-year birds to second-year birds is of some significance. Eight out of twenty-one—more than one out of every three—recoveries were second-year birds. This ratio is abnormally high, and, in fact, more than twice as high as the average ratio of *all* first-year to second-year recoveries from all the colonies heretofore discussed. If we assume that this average ratio applies to the Green Bay colonies (and it is hard to believe that the mortality-rates would differ materially) then it follows that the second-year birds from these particular colonies are more than twice as likely to scatter into Canada than the first-year birds. Furthermore, four out of the eight birds were picked up in such widely separated regions as Newfoundland, northern Ontario, and Saskatchewan. The first-year birds confine their Canadian wanderings mainly to the Great Lakes littoral, as would be expected, although one bird did reach James Bay, P. Q., and another was recovered two hundred twenty-five miles east-northeast of the city of Quebec.

The distribution of the recoveries listed above is shown on the map (Figure 8, page 71). In general the first-year gulls from this colony scatter widely throughout the southern Great Lakes region during September with a tendency to work southward. A substantial number migrate southward down the Mississippi River valley to the Delta region, but this characteristic is by no means conspicuous. Apparently a not inconsiderable portion of the young birds winter in the Great Lakes region, some working eastward to Erie and Ontario and

thence overland to the New Jersey coast or down the St. Lawrence River valley. Obviously the Green Bay colonies are very similar to those of the Beaver group near St. James, Michigan, considered below. Neither group has inherited very definite migratory instincts such as are so conspicuous among those of the Atlantic seaboard. Furthermore, there is no evidence as yet of any marked tendency for the one-year-old birds to return to the general region of the breeding-ground during the second summer.

Because of the paucity of data no analytical graph has been prepared to show the migration-curve. Instead, the list of recoveries has been arranged chronologically according to their ages, with the air-line distance in miles from the banding station indicated in each case. By inspection the reader may gain a satisfactory impression of the complicated movements of the gulls during their first year. To judge from the number of Canadian recoveries during the years 1927 to 1930, it is apparent that there are ample data as yet unpublished from which to make an adequate analysis not only of second-year birds but presumably of older gulls as well.

The Beaver Island Colonies Near St. James, Michigan

Extensive banding operations among the Herring Gulls of the so-called Beaver group of islands near the northern end of Lake Michigan have been conducted during the past ten years, chiefly by Mr. F. C. Lincoln from 1922 to 1926. He has kindly put at my disposal data obtained from the banding done in these years. No records of recoveries made later than 1930 are available.

In the following list of recoveries, arranged in chronological order according to age, the total number considered (excluding twenty juveniles less than two months old found at the banding stations) is 89, of which 67 are first-year birds, 11 are second-year, 3 are third-year, 4 are fourth-year, 3 are fifth-year, and 1 is a sixth-year bird. The locations of the first-year recoveries are shown on the map (Figure 9, page 74).

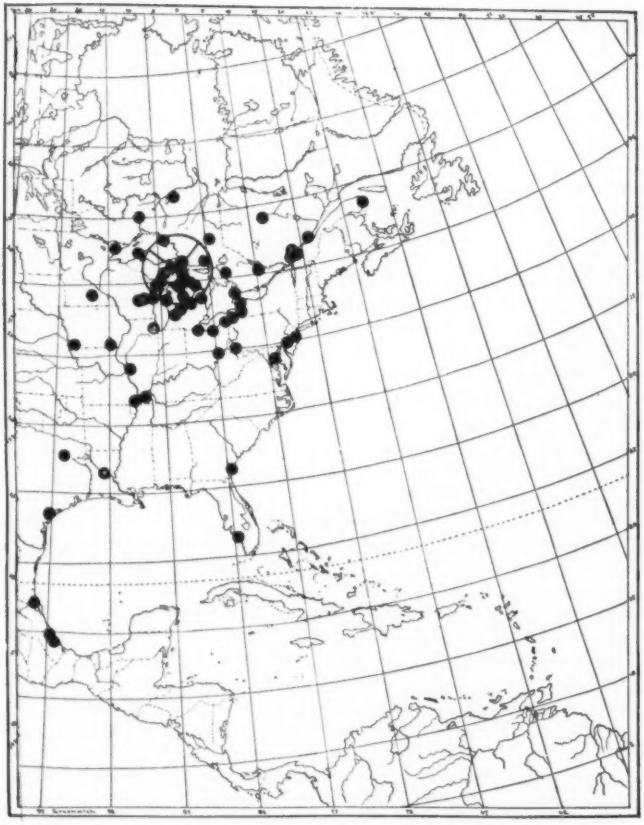


Figure 9. Map showing the distribution of first-year recoveries from colonies of the Beaver Islands Group near St. James, Michigan.

HERRING GULLS BANDED AT ST. JAMES, MICHIGAN, ON ISLANDS OF THE BEAVER GROUP, BY F. C. LINCOLN UNLESS OTHERWISE INDICATED

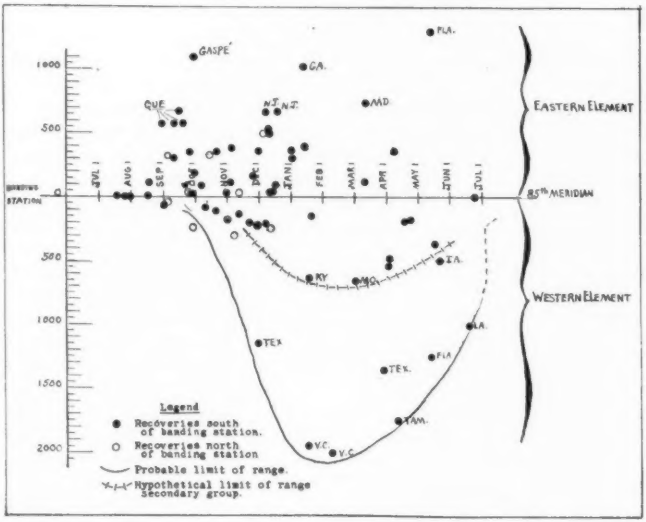
Date of Banding	*Band No. of Recovery*	*Place of Recovery*	*Date of Recovery*	*Reference*	*Age of Gull Recovered*	*Air-Line Distance from Banding Station*
7/ 8/25	386154	Alpena, Mich.	8/18/25	C	1st year	110-ESE
7/ 3/25	378049	Montreal, Que.	8/30/25	K	" "	575-E
7/22/23	236859	Northport, Mich.	9/ 1/23	C	" "	35-S
7/ 8/25	386240	Detroit Harbor, Wis.	9/ 1/25	C	" "	70-WSW
7/20/24	321138	Manistique, Mich.	9/ 4/24	FD	" "	40-WNW
7/ 2/25	385656	Tashota, Cochrane, Ont.	9/ 4/25	K	" "	300-NE
7/22/23	231393	Montreal, Que.	9/ 9/23	K	" "	575-E
7/22/23	236807	Toronto, Ont.	9/10/23	FD	" "	300-ESE
7/20/24	321148	Montmorency Vill., Que.	9/15/24	FD	" "	675-E
7/ 8/25	386086	Montreal, Que.	9/20/25	C	" "	575-E
7/22/23	236853	St. Ignace, Mich.	9/25/23	F	" "	40-ENE
6/27/25	385537	Ashtabula, Ohio	9/26/25	F	" "	350-SE
7/22/23	236861	Petoskey, Mich.	9/27/23	C	" "	35-ESE
7/25/23	237062	Port Austin, Mich.	9/27/23	FD	" "	170-ESE
7/18/24	321027	Northern shore of Lake Superior	9/29/24	FD	" "	250-NW?
7/ 7/25	378078	Rivière au Renard, Gaspé Co., Que.	Fall/25	C	" "	1100-ENE
7/24/23	236927	Houghton Lake, Mich.	10/ 7/23	K	" "	95-SE
6/27/25	385520	Washington Is., Wis.	10/11/25	FD?	" "	70-WSW
7/ 3/25	385697	Copper Cliff, Ont.	10/14/25	F	" "	325-ENE
7/25/23	237078	Manistee, Mich.	10/20/23	F	" "	105-SSW
6/27/25	385595	Mouth of Pickerel River, Georgian Bay, Ont.	10/21/25	FD	" "	350-E
7/25/23	237170	Carp Lake, one mile from Trant Lake, Mich.	10/31/23	FD	" "	40-E
7/25/23	237150	Calumet, Mich.	11/ 1/23	I	" "	180-WNW
7/24/23	236925	Alpena, Mich.	11/ 3/23	K	" "	110-ESE
7/ 3/25	385766	Renfrew Co., Ont.	11/ 4/25	FD	" "	390-E
7/25/23	236993	Gull Bay, Outpost, Lake Nipigon, Ont.	11/ 7/23	C	" "	300-NNW
7/22/23	231343	40 miles west of St. Ignace, Mich.	11/11/23	FD	" "	35-NNE
7/ 8/25	386249	Ludington, Mich.	11/11/25	FD	" "	130-SSW
7/ 3/25	385869	Lake Big Butte des Morts, Wis.	11/23/25	FD	" "	200-WSW
7/22/23	236834	Mouth Saginaw River, Mich.	11/25/23	I	" "	160-SE
7/16/22	202237**	Ennis, Texas	11/30/22	C	" "	1150-SW
7/ 3/25	385789	Sandusky Harbor, Ohio	12/ 1/25	FD	" "	360-SSE
7/ 3/25	385834	Parent, Champlain Co., Que.	12/ 4/25	K	" "	490-ENE
7/20/24	321211	Riverton, N. J.	12/ 6/24	FD	" "	660-SE
7/25/23	237013	Kenosha, Wis.	12/ 7/23	C	" "	250-SW
7/18/24	321025	Springbay, Ill.	12/ 7/24	K	" "	200-S?
7/ 3/25	385661	Jerusalem, Ohio	12/ 9/25	C	" "	500-SE
7/ 8/25	386159	Holbrook, Pa.	12/ 9/25	C	" "	525-SE
7/25/23	237047	Hovland, Minn.	12/10/23	F	" "	250-NW
7/18/24	321041	Clarlevoix, Mich.	12/10/24	K	" "	30-SE
7/22/23	23682–	East Jordan, Mich.	12/12/23	FD	" "	40-SE
7/ 3/25	385946	Raritan Arsenal, Metuchen, N. J.	12/18/25	FD	" "	660-SE
7/25/23	237022	Sugar Is., St. Mary's River, Mich.	12/—/23	FD	" "	90-ENE
7/ 3/25	385785	Presque Isle, Erie, Pa.	1/ 1/26	FD	" "	360-SE
6/24/25	312884*	Banks of Maumee River, Ohio	1/ 2/26	I	" "	300-SSE
7/16/22	202248**	Brunswick, Ga.	1/12/23	C	" "	1020-SSE
7/22/23	236829	Angola, N. Y.	1/12/24	FD	" "	390-ESE
7/ 3/25	385728	Vera Cruz, Mexico	1/17/26	K	" "	1950-SSW
7/16/22	202213**	Wickliffe, Ky.	1/18/23	FD	" "	630-S by W
7/ 7/25	378090	Two Rivers, Wis.	1/20/26	FD	" "	150-SW
7/ 3/25	385786	Alvarado, Vera Cruz, Mexico	2/10/26	K	" "	2000-SSW

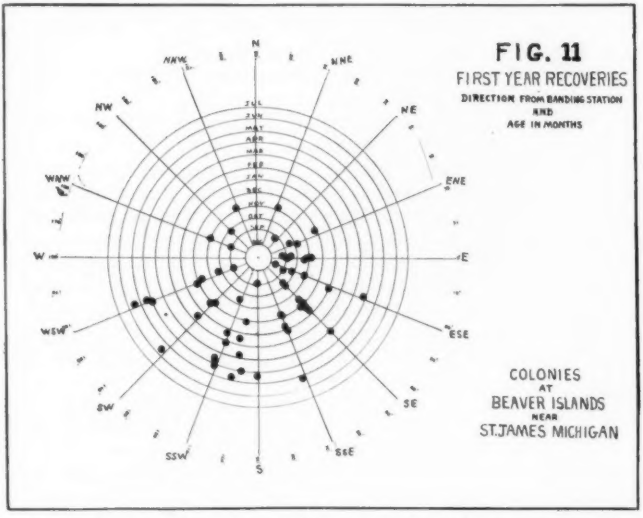
Date of Banding	*Band No. of Recovery*	*Place of Recovery*	*Date of Recovery*	*Reference*	*Age of Gull Recovered*		*Air-Line Distance from Banding Station*
7/ 8/25	386108	New Madrid, Mo.	3/ 1/26	K	"	"	660-S by W
7/ 3/25	385667	Calhoun Co., Texas	3/27/26	FD	"	"	1350-SSW
7/25/23	237035	St. Louis, Mo.; Alton, Ill.	4/ 2/24	FD	"	"	540-SSW
7/ 8/25	386047	Ottumwa, Iowa	4/ 3/26	C	"	"	480-WSW
7/ 8/25	386191	Niagara River, Youngstown, N. Y.	4/ 6/26	FD	"	"	360-ESE
7/ 8/25	386090	Hurricane Is., Ill.	4/ 9/26	FD	"	"	?-S
7/20/24	321168	Tampico, Mexico	4/10/25	C	"	"	1750-SSW
6/27/26	385506	Oshkosh, Wis.	4/19/27	FD	"	"	190-WSW
7/25/23	237151	Grand Rapids, Mich.	4/20/24	FD	"	"	190-S
7/ 8/25	386169	Muskegon Hts., Mich.	4/24/26	C	"	"	185-S by W
7/ 8/25	386199	Alto, Mich.	5/ 8/26	FD	"	"	125-SSE
6/24/25	312893*	Gasparilla Is., Fla.	5/12/26	FD	"	"	1300-SSE
7/ 3/25	378071	Waseca, Minn.	5/16/26	K	"	"	360-WSW
7/ 8/25	378095	Coin, Iowa	5/22/26	C	"	"	500-SW
7/18/24	321003	Chanderlier, La.	6/20/25	FD	"	"	1000?-SSW
7/20/24	321127	St. James, Mich.	6/26/25	FD	"	"	–
7/ 8/25	386168	Wabasha, Minn.	7/23/26	K	2d year		
7/ 7/25	378088	Outlet Macatawa Bay, Mich.	8/ 7/26	FD	"	"	
7/ 3/25	385945	Two Rivers, Wis.	8/10/26	FD	"	"	
7/ 3/25	385764	James Bay, Ont.	9/ 5/26	K	"	"	
7/18/24	321055	Nahma, Mich.	10/ 3/25	F	"	"	
6/27/25	385583	Gary, Ind.	12/24/26	K	"	"	
6/27/25	385558	Mason Co., W. Va.	12/29/26	C	"	"	
7/25/23	236950	Muskegon, Mich.	1/27/25	C	"	"	
6/27/25	385594	Honor, Mich.	2/16/27	C	"	"	
7/ 8/25	386111	Niagara on the Lake, Ont.	3/ 9/27	FD	"	"	
7/25/24	321268	Cassopolis, Mich.	3/15/26	C	"	"	
7/25/23	237119	Greenbay, Wis.	Fall/25	FD	3d year		
7/ 8/25	386031	Granville, Ill.	3/ 1/28	I	"	"	
6/27/25	385570	Muskegon, Mich.	5/25/29	FD	"	"	
7/ 8/25	386299	Alvin, Texas	12/25/28	FD?	4th year		
7/25/24	321276	St. James, Mich.	1/10/28	FD	"	"	
7/22/23	236903	Rubicon, Wis.	3/ 6/27	C	"	"	
7/22/23	–	Racine, Wis.	4/17/27	I	"	"	
7/ 3/25	378038	Naubinway, Mich.	7/17/30	C	5th year		
7/25/23	237107	Manistique, Mich.	6/12/29	C	"	"	
7/25/23	237097	Manistique, Mich.	6/19/29	C	"	"	
7/25/23	237134	Manistique, Mich.	8/18/29	C	6th year		

* Banded by W. E. Hastings.
** Banded by W. S. McCrea.

References: C—Caught; FD—Found dead; F—Found; I—Injured; K—Killed.

The movements of the first-year gulls are obviously complicated. The pattern of distribution is strikingly dissimilar to that of those other colonies previously considered concerning which there is ample data, *viz.*, Essex County, Isles of Shoals, and Saguenay County, Quebec. As would be expected, the greatest density of recoveries is in the Lake region of Michigan and Wisconsin. A substantial proportion moved eastward down the lower lakes to the St. Lawrence River as far as Quebec and beyond. One bird, 378078, was captured in the autumn somewhere in Gaspé County. A somewhat small percentage moved down the Mississippi River valley to places as far south along the Gulf Coast as Vera Cruz, Mexico. A fourth trend, perhaps, is indicated by four December-to-March recoveries from New Jersey to Georgia.





Upper Figure (No. 10). Rectilinear graph of first-year recoveries from the Beaver Group Colonies.

Lower Figure (No. 11). Polar graph of first-year recoveries from the Beaver Group showing direction from banding station according to age of the gulls.

There are several interpretations which might account for the wide dispersal throughout the eastern half of temperate and subtropical North America, the simplest being that the Beaver group colonies possess no fixed habit of migration—some individuals migrate south, others east, while still others wander indiscriminately in search of a food-supply and open water. Another possibility is that the colonies are a mixture of two or more strains possessing different migratory traits. A third suggestion is that the confusing aspect of the map is merely superficial, and may be resolved into some semblance of law and order if proper analytical methods are employed.

In order to test these several possibilities, various graphs were kindly prepared by Mr. Richard M. Hinchman whereby the changes were rung on the functions of age, distance, and direction, both in respect to all the recoveries considered as a whole and to those east and west of the eighty-fifth meridian considered separately. Although certain vague lines of demarcation were discerned, in general it must be frankly admitted that a much larger body of data is necessary before any definite conclusions may be drawn.

Lack of space precludes the publication of all but two of the various diagrams that were prepared. The following facts are derived from the rectilinear graph showing age and distance from banding station (Figure 10).

1. Many birds winter within six or seven hundred miles of the banding stations.
2. No birds were recovered north of the latitude of the banding stations after December 5th.
3. The "eastern element," *i. e.*, the birds recovered east of the eighty-fifth meridian, showed a normal distance-age curve with a maximum amplitude of seven hundred miles in midwinter. The recovery in Georgia (January) and that in Florida (May) lay outside the normal limit of range. If we assume that these two birds migrated down the Mississippi and thence eastward along the coast, then they may properly be assigned to the western element. If so, they fall within the normal limit of range for that element.
4. The "western element" appears to be split into two divisions, one of which may show a midwinter limit of range in the central Mississippi Valley region, and the other a normal Gulf Coast midwinter distribution from Texas to southern Mexico. This division may prove to be purely fictitious.

Another graph, plotted with polar coördinates, shows the relation between age and direction from banding station. This is repreduced in Figure 11. It clearly demonstrates the fact that no recoveries occurred north of the banding station after December 1 or thereabouts. It also shows the tendency, previously noted, of the eastern element to remain nearer home during midwinter than is the case with the western element.

The eleven second-year recoveries are well distributed from July to March. With the exception of 385558 in West Virginia, these birds were found in the Lake region not far distant from their breeding-grounds. It is probable that the second-year birds from the Beaver Islands colonies normally winter northward without exhibiting any noticeable migratory tendency.

The third-year and adult recoveries show a similar distribution. The gulls from these colonies show a marked homing instinct. It is particularly interesting to notice that a fourth-year bird, 386299, was found at Alvin, Texas, late in December. This is the first instance of an adult bird lingering on the Gulf Coast, in so far as this paper is concerned, and the second instance of the occurrence there of a bird older than the first winter.

In concluding these somewhat unsatisfactory observations concerning the Beaver group colonies, the writer is inclined to believe that a satisfactory analysis requires more detailed and accurate knowledge of the precise islands from which the recoveries originated. It is not impossible that a further unscrambling of the data, at present impossible, will show that the Texas and Mexican recoveries are characteristic of a single colony in the group; likewise that the eastern element is also a distinct colonial entity. In this connection, it is only fair to add that casual studies of other colonies (not to be included in this paper) appear to make this latter view somewhat improbable. It seems to be characteristic of the Herring Gulls of the upper lakes to "scatter all over the map" during the first year. The majority behave as if they were landlocked in the Lake region wherever open water and food may be found. A lesser number cross the divides between the major watersheds and follow the large river-valleys to the ocean, some to the Atlantic and others to the Gulf.

CONCLUSION

This very cursory and necessarily incomplete study of the migratory traits of certain colonies of Herring Gulls in eastern

North America appears to justify the tentative hypothesis that there are at least three major breeding populations of this species within this region, each of which is characterized by well-marked migratory idiosyncrasies. It must not be inferred that the number is restricted to three. Banding work among extralimital colonies in Labrador and elsewhere[1] may well show that a high-Canadian or subarctic population exists.

The three populations conveniently may be designated as:

1. *Atlantic:* Characterized by a breeding-range from Massachusetts (Long Island?) to New Brunswick along the coast and by a very marked habit of migration on the part of the first-year birds to the Gulf Coast during the first winter. There is some evidence that a northern element of this population migrates to an area centering on the eastern coasts of the south Atlantic states. There is strong evidence that certain individual colonies possess unique centers of first-winter distribution.

2. *Laurentian:* Characterized by a breeding-distribution along the St. Lawrence River (lower Lake region?) to the Gulf of St. Lawrence (Labrador?). This population apparently possesses no habit of true migration to a southern wintering-ground during the first winter. The movements of immature and adult birds are indistinguishable, are highly localized, and are restricted to the general region of the breeding-range and the Maritime Provinces.

3. *Lacustrine:* Characterized by a breeding-range centering on the upper Great Lakes and by a habit of wide dispersal during the first winter throughout eastern North America from southern James Bay southward to the Gulf Coast of Texas and Mexico. The largest fraction of the first-year birds appears to winter wherever open water may be found in the southern Great Lakes drainage system. A lesser fraction shows a distinct habit of migration down the Mississippi to the Gulf Coast or up the larger tributaries to favorable places in the interior. A still smaller fraction wanders eastward to winter along the Atlantic seaboard from New York to Florida.

These three populations may overlap somewhat, particularly in the Great Lakes region. However, it is very possible that future study, based on more complete data, will necessitate a revision of the foregoing conclusions. In detail the picture is

[1] Contrary to the general impression, it is reported that Herring Gulls breed as far north as Baffin Island. See J. Dewey Soper: *A Faunal Investigation of Southern Baffin Island. Bull. Can. Dept. Mines*, Biol. Series 53, 1928.

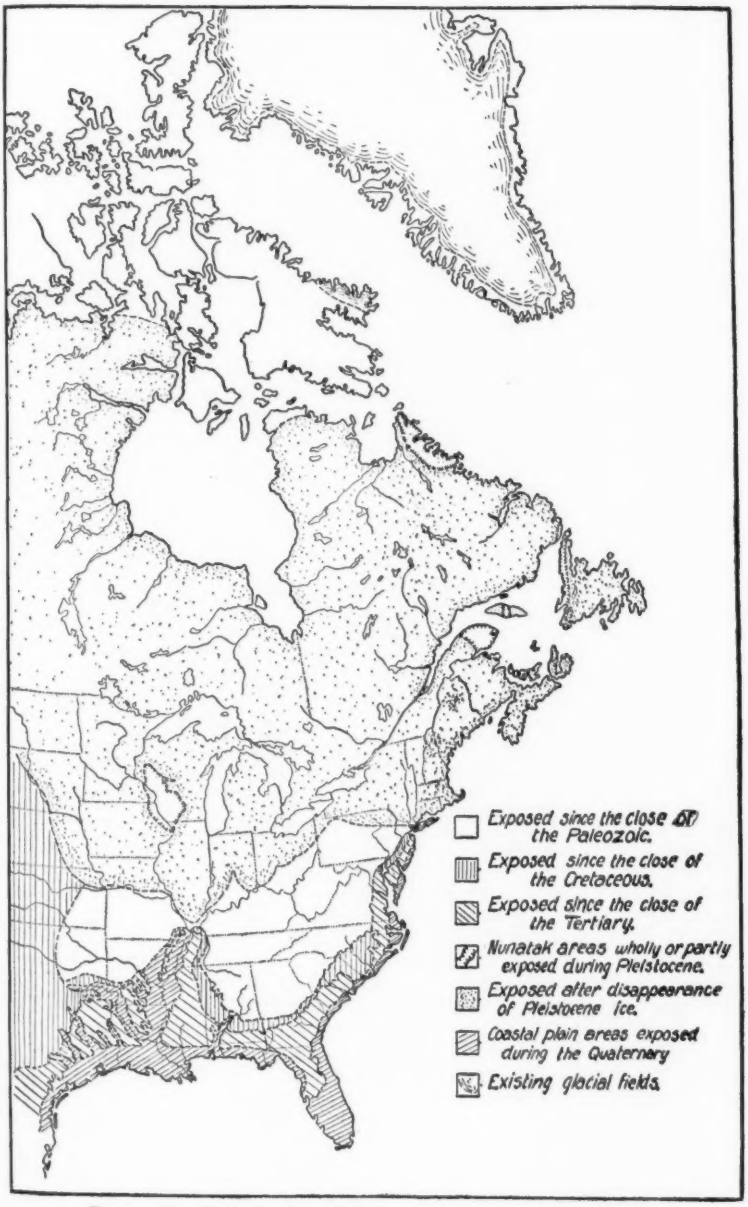

Exposed since the close of the Paleozoic.
Exposed since the close of the Cretaceous.
Exposed since the close of the Tertiary.
Nunatak areas wholly or partly exposed during Pleistocene.
Exposed after disappearance of Pleistocene Ice.
Coastal plain areas exposed during the Quaternary
Existing glacial fields.

Figure 12. Periods of availability for plant-occupation of Eastern North America since the Paleozoic. (Reproduced by permission of Professor M. L. Fernald.)

hazy and doubtless inaccurate; in broad outline, suggestive of the probable truth.

It is difficult to resist the temptation to "explain" the alleged existence of these three Herring Gull populations. Any thoughtful student of biogeography necessarily must be impressed with the profound influence of the Pleistocene glaciations on the present distribution of the fauna and flora of temperate North America. That our avifauna was driven southward by the successive advances of the ice is evident. The last great invasion, known as the Wisconsin phase, is variously estimated to have reached its climax 25,000 to 40,000 years ago. It was preceded by a warm interglacial epoch believed to have lasted at least 150,000 years. The regions currently supposed to have been submerged by the Wisconsin ice-sheet are shown on Figure 12, page 81. The southern limit of the advance frequently is marked on the ground by well-defined terminal moraines. If we accept the conservative view of the older geologists that the Wisconsin ice overrode Labrador, the Maritime Provinces, and the highest mountains of New England and New York, as well as the entire basin of the Great Lakes, it is obvious that all bird-life now occupying the glaciated areas were driven far south of their present breeding-grounds.

On this view, the most northerly conceivable limit of breeding-range for the Herring Gull, for instance, would have been south of the general line Long Island-southern Ohio-southern Wisconsin. Since the Herring Gull is not an Arctic species, we should expect that the only suitable breeding-grounds during the climax stage of the Wisconsin would be found several hundred miles south of the permanent ice-front and possibly as far south as coasts of the south Atlantic and Gulf States. If so, it is entirely reasonable to suppose that the species, perhaps fundamentally non-migratory, acquired a temporary habit of frequenting the warm waters of the Gulf, and that the pronounced tendency of immature birds to spend their first winter there is a vestigial trait lost in adult birds. As the ice retreated, the gulls gradually recaptured more and more of the old territory, and finally returned to breed in the highly favorable lacustrine, estuarine, and coastal areas of the northern United States and Canada. It might be suggested that the peculiar mixture of migratory traits of gulls of the Green Bay and Beaver Island colonies, for instance, tends to strengthen the idea that they are rapidly losing their temporary urge to go south for the winter. Possibly, the ice

retreated from the Great Lakes region much earlier than from New York and New England, thus allowing the gulls to repossess their favored breeding-grounds much earlier and to progress faster than their eastern representatives in the matter of forgetting the lures of the sunny South.

However this may be, the hypothesis is plausible provided we ignore the Laurentian population, which, it will be recalled, possesses no apparent urge to migrate to the south whatsoever. In fact, the Saguenay County colony scatters east and northeastward. If the last advance of the ice was as devastating as we were led to believe, the entire lower St. Lawrence region, including the Maritime Provinces, must have been submerged to the depth of thousands of feet. Thus as the ice-front rotted and gradually retreated northward, the New England coast-line would necessarily become available for repopulation before the Laurentian area. Hence, we should naturally expect that the more northward colonies would be mere extensions or overflows from those in the south and necessarily would possess the same migratory characteristics.

This anomaly would be very puzzling were it not for the interesting fact that the foregoing picture of the Wisconsin ice-sheet is probably erroneous. It is becoming increasingly evident that the Wisconsin ice-sheet was far less devastating in the Maritime Provinces than was originally supposed. The extensive botanical researches by Professor M. L. Fernald and his associates during the past twenty years in Nova Scotia, Newfoundland, Gaspé, and Anticosti have proved the existence of an important relic flora in areas showing no evidence of recent glaciation. Coleman independently examined many of the regions explored by Fernald and has accepted the view on geological grounds that important areas in the region of the Gulf of St. Lawrence escaped Wisconsin denudation.[1] Such convincing evidence, both botanical and geological, has accumulated that the writer accepts these views without reservation.

Thus, instead of a lifeless and continuous ice-sheet in the northeast, in all probability the lower Gulf of St. Lawrence was open water and large areas of the neighboring land-masses were bare in the summer months. Granting such to be the case, there is no reason to suppose that the Herring Gull

[1] For a full discussion of these questions and for illuminating bibliographical references see Fernald, "Persistence of Plants in Unglaciated Areas of Boreal America, *Mem. Amer. Acad.* XV No. III, (*Mem. Gray Herb.* II) 295–317 (1925). Also see Fernald, "Specific Segregations, etc.," *Rhodora* 33:27, 37 (1931) (*Contr. Gray Herb. X*, CIII).

necessarily was driven south by the invasion of the Wisconsin ice. It is not at all impossible that this species continued to breed in the region throughout the climax phase of the last advance of the Pleistocene ice. Such colonies, if they existed, more likely would scatter northeastward during the winter months to the coast of the Maritime Provinces, where in all probability winter conditions were not much more severe then than now, rather than attempt to traverse the long foodless expanse of ice-front from New Brunswick to New Jersey. In any event it is difficult to believe that the summer climate of the Gulf of St. Lawrence during the Wisconsin was any less favorable to Herring Gulls than the present climate of Baffin Island, where, according to Soper, this species now breeds. It must be remembered that even the most southerly tip of Baffin Island is within four hundred miles of the permanent ice-floes of Davis Strait and within five hundred miles of the permanent Greenland ice cap. In fact, extensive permanent ice-fields occur on the eastern side of Baffin Island itself. Thus, mere proximity to glacial conditions is not abhorrent to present-day representatives of *Larus argentatus smithsonianus*. Incidentally, it may be of some significance to note that Baffin Island for the most part is considered by many competent authorities to have escaped Wisconsin glaciation.

In brief, the not unreasonable guess is hazarded that the Laurentian population of Herring Gulls may be descendants of birds that were never driven away from their breeding-territory by the Wisconsin glaciation, and acquired a degree of hardihood not demanded of the southern populations. In this connection, a study of the migratory habits of the Baffin Island Herring Gulls would be particularly interesting.

Furthermore, a critical comparison between two series of skins of breeding adults, if collected in the nesting-season at the Saguenay County and the Essex County rookeries, for instance, might show some slight differentiation between the two populations. Such evidence would go far toward substantiating the suspicions herein advanced.

As a further speculation, we may conceive of a gradual repossession of old breeding-grounds *southwest* up the St. Lawrence River. If such a recapture of territory occurred, the Laurentian overflow sooner or later must have met the outposts of the reviving Lacustrine population. Perhaps the meeting of these two hypothetical strains accounts for the peculiar mixture of migratory traits which is so perplexing in such colonies as the Beaver group near St. James, Michigan The suggestion contains a touch of plausibility.

THE END

MIGRATORY MOVEMENTS OF EASTERN FOX SPARROWS ON CAPE COD, IN RELATION TO THE WEATHER[1]

By MAURICE BROUN

THE unusually favorable location of the Austin Ornithological Research Station near the end of Cape Cod, Massachusetts, and its ideal variety of conditions for attracting birds, make it something of a "catch-all" for birds passing through the region.[2] Intensive trapping on this area, coupled with constant observation, results in a fairly accurate knowledge of the local status of many species.

Among the various functions of the Station is that of ascertaining what factors—meteorological, ecological, or otherwise—govern the status of any particular species. The following notes were prepared to show to what extent local migration of Fox Sparrows are controlled by temperature and wind conditions. On the mainland, migrations of Fox Sparrows are relatively regular and uniform. A study of the records of 254 of these birds, banded at the Station since October, 1930, points to great migratory irregularity of the species on the Cape.

Generally speaking, the autumnal seasons of 1930 and 1931 were mild, and, similarly, both were characterized by temperatures which averaged above normal. During the fall of 1930 heavy waves of migrating sparrows were reported throughout the New England area. Juncos and White-throated Sparrows, particularly, visited the Cape in large numbers. Yet only seven Fox Sparrows were taken at the Station. The first of these was banded on October 17th, and the last on November 8th; none repeated.

The autumnal migration of 1931 proved a decided contrast to that of 1930. A dearth of migrating birds was widespread in New England—a condition that has been attributed to the excessive rains of the breeding season, occasioning great losses to nestlings. The smaller migrants were taken at the Station in far less numbers than during the preceding fall. Fox Sparrows (*Passerella i. iliaca*), however, were very abundant, 150 having been trapped and banded from October 13th, the date of the first arrival, to November 25th.

[1] Contribution No. 18 from the Austin Ornithological Research Station.
[2] For a description of Station, see *Bird-Banding*, Vol. III, No. 2, p. 51.

Single individuals were taken on October 13th, 19th, 23d, and 28th, respectively. Fox Sparrows were absent from the Station from the latter date to November 5th, when another single bird was taken. During that period local weather conditions were good; the temperatures averaged 50°, and moderate westerly or northwesterly winds prevailed. On November 7th, coincident with a decided drop in temperature (minimum 28°) and brisk northwesterly winds, a large flock of Fox Sparrows appeared at the Station. During the next four days 112 birds were banded. Temperatures meanwhile regained their former high average, and the migration came to a temporary standstill. On the 12th, a day beginning with heavy frost and fresh easterly winds, about 28 Fox Sparrows remained. These repeated in the traps, their numbers gradually diminishing, while 30 new birds drifted in until the 24th. During this time the temperatures ranged from 50° to 60°, and the wind-directions were variable. On November 25th the temperature once again took a drop, from 58° to 40°, and the wind was southeasterly. These conditions occasioned the exodus of the Fox Sparrows apparently. Only one of the 150 birds that were banded between November 7th and 25th was present after the latter date.

Nine stragglers appeared in the traps after November 25th, and of these, four, possibly five, birds, spent the winter. This was an unusually mild winter in southern New England. Clemency of weather, coupled with an ever-available food-supply at the traps, no doubt induced the winter sojourn of the birds in question. One of these birds, B148827, banded on November 26th, was intermittently trapped throughout the winter, and was taken last on March 31, 1932. The other three birds were more or less constant repeaters, their records being as follows: B148829, banded on November 28th was in the traps almost daily until April 5th; B148831, banded December 2d, was taken for the last time on March 13th; and B148834, banded December 13th, was a fairly regular repeater up to the last day of its stay, April 10th. Attention may be called here to B148825, which was banded on November 25, 1931, and reappeared for the first time after banding, on April 6, 1932. On the surface, this might be considered a return. It is probable, however, that the bird wintered in the vicinity.

One of the above birds, B148829, has an interesting history, considered from the angle of range of winter feeding. During its stay, a period of 130 days, it repeated in the traps a total of 143 times. There were ten "off" days when the traps were

not in operation. During 21 consecutive days, in which trap-rounds were made usually four times daily, this sparrow was taken 70 times. The bird became remarkably tame and, when handled, showed neither fear nor nervousness. When released, it invariably flew but a few feet to a commanding perch. During the first part of the winter the bird became addicted to a place about a quarter of a mile from head-quarters, where it practically lived in two traps located on the edge of a tangle of briery thickets. Early in January it became attached to a more sheltered spot yet another quarter of a mile distant. This new location, on the edge of a pond, densely overgrown with sweet clethra, alders, lambkill, and catbrier, became the retreat from which the bird rarely moved.

The 1932 and 1933 autumnal migrations of Fox Sparrows on the Cape were very disappointing. In 1932 a total of 17 individuals was taken on 10 different days, from October 21st to November 21st. It may be recalled that the fall flight of small birds in New England, in 1932, was one of the heaviest in years. Unprecedented numbers of Juncos, Song Sparrows, White-throated Sparrows, and Thrushes visited the Station during the month of October. Precipitation was above normal, while temperatures were normal and fairly uniform. On fourteen days during the month winds came from southerly quarters, and on only eight days the wind came from the north. Four distinct migration waves, each lasting three or four days, were recorded at the Station. The fourth and last influx of of small birds, which, incidentally was by far the heaviest, took place on October 21st, the arrival date of the first Fox Sparrow. From the 21st to the 25th a total of 1221 small birds of various species were banded, and of these only 11 were Fox Sparrows. At this time the winds were consistently northeasterly, and the temperatures averaged 58°. A drop of temperature to 39° in the early morning of the 25th was synchronous with the hasty end of the migration, for after that date very little movement was manifest. Single Fox Sparrows appeared desultorily on October 26th, 29th, 30th, November 3d, 4th, and 21st.

The 1933 fall migration of land-birds on the Cape was the antithesis of that of 1932. The prevailing winds during October were northerly; the temperatures were below normal. The northeasterly winds, so fruitful the year before, failed to bring migrants, for during the first week of the month wind-direction was monotonously northeast, and very little movement of birds was observed at the Station. A total of 14 Fox Sparrows was recorded, the first arriving on October 16th,

the others following desultorily up to November 2d. During this time, an almost complete absence of passerine birds was experienced on the lower Cape.

The spring migrations of Fox Sparrows offer interesting contrasts. During the early spring of 1931 the migration of small birds was poor. A Fox Sparrow was banded at the Station on April 7th, the only record for the spring. Temperatures during March and April were above normal; the precipitation was slight. Winds were mainly from northerly quarters.

Average temperatures and a normal volume of bird-movement obtained during the spring of 1932. Of 31 Fox Sparrows recorded, 12 disappeared immediately after banding, while the others tarried a few days, entering the traps a total of 49 times. The first of these appeared on March 8th. It is possible this bird wintered in the vicinity. Not until March 21st did the next Fox Sparrow arrive, and one to four new birds were taken daily until April 5th, when the flight was practically over. A distinct movement took place on March 30th, when six new birds were taken. During late March and early April the temperatures fluctuated greatly, and the winds came from a westerly or southwesterly direction on all but three days. A belated transient was taken on April 20th, and, with the exception of B148834 (one of the wintering birds), the Fox Sparrows were gone by April 9th.

The weather conditions of the early spring of 1933 were similar to those of the spring of 1931. Again the early migrants were slow in arriving. Better success was had with Fox Sparrows, however, for 21 were recorded, of which 11 lingered briefly and repeated a total of 48 times. The first bird arrived on March 10th, and single individuals, generally, straggled through until April 8th. On April 4th the first pronounced movement of small birds was noted, and 6 Fox Sparrows were trapped. These birds appeared during a brisk sou'westerly, with temperatures around 50°, a higher recording than those obtained earlier. It would seem as though this influx of small birds was precipitated by both wind and temperature conditions.

The foregoing notes indicate that Fox Sparrows are very irregular migrants on Cape Cod, and that they occur in sporadic abundance. Some of these birds are resident on the Cape throughout the winter. As far as could be ascertained, distinct movements of the species appeared to be governed by the temperature; while wind-direction alone appeared to exert a questionable influence.

North Eastham, Cape Cod, Mass.

A STATEMENT FROM THE BIOLOGICAL SURVEY

IT has been most gratifying to the Biological Survey that its many friends and coöperators have shown such an effective interest in maintaining and furthering its work by bringing to the attention of the Budget Bureau and to members of Congress the importance of continuing appropriations, the loss of which was threatened in connection with early consideration of the Budget for the coming fiscal year (beginning July 1, 1934). The support in this matter, given by our bird-banding coöperators is very much appreciated.

The effect of the restoration of these items is to provide for the Bureau a sum equal to that available during the current fiscal year. This means that the bird-banding work can be continued along the same lines as in the past, and that the Survey should be able to furnish all stations with an adequate supply of bands, though the funds for the coming year will not permit expansion. Accordingly, the restriction relative to the issuance of additional permits must continue in force.

Everyone interested in this form of investigation regrets the necessity for curbing the growth of the work. It is hoped, however, that the time is not far distant when it may be possible to go ahead on a plan broad enough to permit the establishment of at least 5,000 banding stations in the United States, Canada, and Latin America.

The basic interest and the volunteer coöperation already exist, and the Survey has in operation an efficient system that will admit of almost unlimited expansion. Banding work, however, is expensive, as every station operator well knows. According to careful estimates, to expand as desirable would require between $20,000 and $25,000 a year, for bands, clerical services, and administration. This is just about twice the amount that is now available. As many coöperators are aware, the Banding Section is seriously under-staffed, and the present clerical force should be doubled to provide efficient service and full utilization of the valuable data that are rapidly accumulating in the files.

Time has already amply demonstrated the importance of this work and its value as a means of ornithological investigation is recognized throughout the scientific world. The Biological Survey is of the opinion, therefore, that with the system that has been evolved during the past 14 years, and with the existing interest of American bird students and sportsmen, adequate financing is the only bar to the full development of the banding method in research. The requisite funds may be supplied either by Congressional appropriation or establishment by interested persons of an endowment fund sufficient to yield the necessary annual income.

J. N. DARLING, *Chief*

GENERAL NOTES

Eastern Savannah Sparrow Returns.—In the *Inland Bird Banding News*, Vol. V, No. 4, of December, 1933, pages 12 and 13, the returns of Savannah Sparrows (*Passerculus sandwichensis savanna*), listed in detail below, were summarized by the secretary of the Inland Association owing to lack of space. As certain matters of interest are omitted in the summary, I am giving the data in more detail below.

Band Number	*Age*	*Date Banded*	*Date Returning*	*Remarks*
B61701		Aug. 12, 1928	May 7, 1929	Found dead by S. T. Holderly in his back yard 100 rods east of place banded
B61716		Aug. 17, 1928	April 30, 1929	
A127861	Ad.	April 26, 1929	May 5, 1931	
C67905		July 1, 1930	May 3, 1931	
C67911	Im.	July 2, 1930	May 22, 1931	
C67911	Im.	July 2, 1930	June 9, 1932	A return-2
C81332	Im.	July 12, 1930	April 22, 1931	
C81343		July 13, 1930	May 4, 1932	
C81367		July 16, 1930	May 11, 1932	
C87562	Im.	July 24, 1930	July 19, 1932	
C87562	Im.	July 24, 1930	June 4, 1933	A return-2
C87566		July 25, 1930	April 25, 1931	
C93641		Aug. 21, 1930	May 26, 1931	
C93641		Aug. 21, 1930	June 17, 1932	A return-2
F28226	Ad.	April 26, 1931	April 25, 1932	
F28256	Ad.	May 16, 1931	June 27, 1932	
F28279		July 4, 1931	July 9, 1933	
F28295	Im.	July 12, 1931	July 27, 1931	Found dead 640 ft. northwest of banding location by Miss Marguerite Bruyn
F36110	Im.	Aug. 3, 1931	June 26, 1933	
F36120	Im.	Aug. 4, 1931	May 9, 1932	
F36120	Im.	Aug. 4, 1931	April 28, 1933	A return-2
F62619	Ad.	Aug. 13, 1931	Aug. 19, 1932	
F62675	Ad.	Aug. 31, 1931	May 24, 1933	Mrs. William Kalmbach found this bird killed by a dog 1½ miles west and 4¼ miles south of banding station
F62691	Im.	Sept. 7, 1931	May 30, 1932	Found crushed on highway 350 feet northwest of station by Miss Marguerite Bruyn
F64723	Ad.	June 14, 1932	May 18, 1933	
F64725	Ad.	June 15, 1932	May 12, 1933	
F91103	Ad.	June 16, 1932	June 18, 1933	
F91116	Ad.	June 26, 1932	June 11, 1933	
F91117	Ad.	June 26, 1932	May 12, 1933	
B163272	Im.	July 17, 1932	June 9, 1933	
B163278	Ad.	July 20, 1932	May 23, 1933	
F91153	Im.	July 25, 1932	June 21, 1933	
F91154	Im.	July 25, 1932	June 22, 1933	
F91158	Im.	July 26, 1932	May 20, 1933	
F91168	Im.	July 30, 1932	June 5, 1933	
F91173	Im.	Aug. 1, 1932	June 20, 1933	
F91175	Im.	Aug. 3, 1932	June 20, 1933	
F91181	Im.	Aug. 5, 1932	May 5, 1933	
F91184	Im.	Aug. 6, 1932	June 25, 1933	
F91197	Im.	Aug. 10, 1932	June 10, 1933	
F91198	Im.	Aug. 10, 1932	Jan. 24, 1933	A recovery, killed by W. S. Parker at Beatrice, Alabama
C113453	Im.	Aug. 11, 1932	May 18, 1933	
C113457	Im.	Aug. 12, 1932	June 10, 1933	

The total number of returns listed above is 33, made up of 11 adults and 22 immature birds. None of the returns of immature birds is known to have been born on my farm. Some may have been, but others were probably reared on neighboring farms where Savannah Sparrows are known to have nested.

These returns of immature birds are deemed of importance as showing a marked tendency for young birds to return to the immediate vicinity of their birthplaces, and the returning dates also show that most of them also nested there.—Oscar McKinley Bryens, McMillan, Michigan.

An American Woodcock Recovery of Interest.—An American Woodcock (*Philohela minor*), apparently stunned, was picked up on the streets of Fairhope, Alabama, and brought to me for banding on December 16, 1932. It was recovered on October 31, 1933, at Sydney, Nova Scotia, Canada, by John E. McCurdy.—HELEN M. EDWARDS, Fairhope, Alabama.

The banding of a Woodcock in Fairhope, Alabama, in December and its recovery at Sydney, Nova Scotia, during the following October is of unusual interest as it so happens that the place of banding is at the southern limit of the species' wintering-range and the place of discovery is at the northern limit of its nesting-range. If we possessed a goodly number of such records, we should be justified in concluding that the most northern-nesting Woodcocks winter along the southern edge of their wintering-range. The record, however, is of importance as it stands and it perhaps constitutes one link in a chain of evidence which it is hoped in time will show whether the birds tend to duplicate their spatial relationship in both their ranges or are indiscriminately distributed without regard to comparable latitude or longitude.

The distance northeast as the crow flies between Fairhope and Sydney is approximately 1750 miles.—EDITOR.

Two Pairs of Tree Swallows Mated During Two Successive Seasons.—I am giving the following additional cases of Tree Swallows (*Iridoprocne bicolor*) being permanently mated. For the earlier records of Mrs. Kenneth B. Wetherbee and Oscar McKinley Bryens, see *Bird-Banding*, 1932, April, pages 72–73 and October, pages 177–178.

The first banded pair to mate during two successive seasons nested first in Box 1 in 1931. On June 17th (when the young were half grown) the female, F41533, was trapped and banded, and on June 22d her mate was given band F41554. Their six young were banded on June 18th with numbers F41535-6-7-8-9-40, and left the next successfully. On June 11, 1932, F41554 was taken as a return-1, and previously, on May 18th, F41533 was a return-1 at Box 5, where the two birds had remated and the female had built a nest and laid a clutch of six eggs, but had disappeared during the night of the 18th only a few hours after being recorded as a return.

The details of second case are as follows: A female was trapped in Box 3 on June 22d, 1931 and given band F41555. On June 6, 1933, F41555 was a return-2 (at least four years old) and her mate (F60909) was a return-1 the same date. They nested again, but unsuccessfully, in Box 1.—LEWIS O. SHELLEY, East Westmoreland, N. H.

An Eastern Fox Sparrow Return and Seven Recoveries.—We have received by the kindness of the Biological Survey, by the hand of Mr. F. C. Lincoln, the list of Fox Sparrow "returns" since 1926 (up to September 19, 1933). These taken in conjunction with data in "Returns from Banded Birds, 1920–1923," and "Returns from Banded Birds,1922 to 1926," afford the following facts:

One return is found at station of banding, *viz.*:

B148825, banded at North Eastham, Massachusetts, November 25, 1931, by Dr. Oliver L. Austin, returnedApril 6, 1932.[1]

The recoveries are as follows:

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[1] B148825 is referred to in this issue by Mr. Maurice Broun. See *Ante*, page 86.—*Editor.*

A171006, banded by O. A. Stevens at Fargo, North Dakota, October 2, 1929; recovered at Ethelbert, Manitoba, April 11, 1930.

A218349, banded by J. T. Emlen, at Germantown, Pennsylvania, March 3, 1930; recovered at Coinjock, North Carolina, December 1, 1930.

47587, banded by B. S. Bowdish, at Demarest, New Jersey, April 2, 1924; recovered a Pinetown, North Carolina, January 26, 1926.

C44476, banded by S. H. Low, at Quincy, Massachusetts, December 8, 1929; recovered at Elmhurst, Long Island, N. Y., December 27, 1930.

132677, banded by F. H. Kennard, at Newton, Massachusetts, March 15, 1930; recovered at Little St. Lawrence, Newfoundland, April 20, 1930.

C197277, banded by F. B. White, at Concord, New Hampshire, April 17, 1933; recovered at Port aux Basques, Newfoundland, May 13, 1933.

In the *Smithsonian Annual Report* for 1932, page 349, "A Decade of Bird Banding in America (Lincoln)" it is noted that Fox Sparrow 643516, banded at Rhinebeck, New York, March 18, 1929, was found at Port au Port, Newfoundland, April 30, 1929.

The territory west of the Rocky Mountains we have excluded, as it seems to need special treatment on account of geographical reasons and the subspecies there.—F. B. White, Concord, New Hampshire.

Banding Barn Swallows.—During the summer of 1933 at Shirley, Massachusetts, I found that it was possible to catch a very satisfactory number of adult Barn Swallows in barns at night without doing any harm to the young. The best record was nineteen adults in about twenty minutes. I always chose a warm night so that the young would not be harmed by lack of brooding, and in checking up there was no evidence of harm to any young birds. There was one sitting of eggs that may have become chilled, though I am not at all certain that this was the case. The best results followed when there were four in the party, two with long-handled butterfly nets and two with flash-lights; this made it possible for one net and one light to be at each end of the barn and saved a great deal of time, though we never failed to catch every bird in the building when only two worked. The nets had a diameter of about a foot and a half, and we used handles of various lengths to suit the buildings. It was necessary to shut the doors and windows, as, on moonlight nights especially, the birds often tried to fly out. After closing of the barn, which was of course done after dark and in the dark as much as possible, it was only necessary to find a swallow with the aid of one of the lights. Ordinarily the bird would immediately start fluttering about, and others would soon do likewise, most of them going slowly from one end of the barn to the other just below the ridge-pole, making it a simple matter when stationed on the scaffolds to catch them in the nets. We did not injure a single bird though we made two trips to each of four barns, and, not counting the repeats, we caught 69 birds, 14 of which were returns from last year. As the birds were caught they were transferred to gathering cages, and the banding was done after all were caught. In releasing them we watched each bird until it had found a safe refuge before we let the next one go. It is hardly necessary to say that great care must be exercised when there are any cats about.—Edward M. Davis, Winter Park, Florida.

A Return-2 Myrtle Warbler.—At my banding station in Fairhope, Alabama, I captured a Mrytle Warbler (*Dendroica coronata*) on December 1, 1930. On December 7, 1931, it was retaken as a return-1, and on January 9, 1934, it was caught in the night in a butterfly-net as it fluttered against a window, apparently bewildered by the light within, making the bird a return-2, and at least four and a half years old.—Helen M. Edwards, Fairhope, Alabama.

Returns of Tree Swallows at East Westmoreland, New Hampshire.—In 1931 four adults and sixteen young swallows that had left the nests were banded, making twenty birds that might return another year.

All four of the adults banded in 1931 were returns in 1932. During the 1932 breeding-season four new pairs nested. Seven new adults were banded, and four escaped capture. (One male, having lost his first mate, remated.) Thus, at the end of the breeding-season nine banded adults and twenty-eight young, successful in leaving the nest, were tagged, giving thirty-seven birds of the 1932 season available to return in 1933.

Owing to tragedies at the station in 1933, and with another increase of two pairs of birds (one pair at substation C later disappeared), not all nine pairs of the 1933 season were captured to learn their status and incidentally determine their band-numbers. But six birds were known to be returns—five returns-1 and a return-2. Two of these returns were a brother and sister from a 1932 brood, the first young reared here known to return to nest. This year-old male, F60913, nested twenty yards from the place of his birth and where his mother again nested in 1933. His sister, F60911, nested four tenths of a mile to the southwest at substation B. Of the young banded in 1933 only one station brood lived to leave the nest—five birds from Box 2.—LEWIS O. SHELLEY, East Westmoreland, New Hampshire.

Starling Banding in Central Ohio During the Winter of 1933-1934,—During the winter of 1933–1934, 19,557 Starlings were captured in Central Ohio on 32 banding expeditions. Of this number 14,549 were banded, 1686 were released as repeats, 638 were released as returns, and 2522 were kept as specimens in special studies being made. Of the 6215 birds banded last year, 10.1 per cent returned. George Wolfram and C. Conklin banded 2145 of the total in 4 bandings in cupalos of barns near Canal Winchester, and 909 others at Columbus. The remainder, or 11,455, were banded by the writer with the assistance of two students, William Ireland and Harry Fabert, during 28 bandings in or near Columbus. In all, 13,669 birds were captured in 9 towers at the Ohio State Hospital, 2460 in towers and steeples in the downtown district of Columbus, 2390 in the Canal Winchester region, and 1083 at distances of 15 to 60 miles from Columbus. In addition about 200 nestlings, immatures and adults were banded during the summer of 1933, mostly by C. Conklin in the Canal Winchester region.

The 13,669 birds handled at the Ohio State Hospital averaged 10.6 per cent repeats and 3.6 per cent returns; the downtown Columbus birds, 4.9 per cent repeats and 1.4 per cent returns; the Canal Winchester birds, 4.5 per cent repeats and 3.1 per cent returns; and those outside of Franklin County, 1.6 per cent returns. The percentage of repeats at the various bandings ranged up to 46 per cent and the percentage of returns as high as 14.6 per cent. In addition numerous recoveries have been received of birds banded during the last three winters. During the height of the spring migration, 1736 birds were captured on March 16th and 2550 on March 17th, at the Ohio State Hospital.

A brief summary of the 1933–1934 winter banding may be made as follows:

Month	*No. of Bandings*	*No. Birds Handled*	*No. Birds Banded*	*No. of Repeats*	*Percent of Repeats*	*No. of Returns*	*Percent of Returns*
December	3	1530	1266	30	2.2	154	10.1
January	9	3587	3144	174	4.9	131	3.6
February	8	3901	3098	310	7.9	138	3.5
March	12	10539	7041	1172	11.1	215	2.0
Totals	32	19557	14549	1686	8.6	638	3.3

The number of Starlings banded from 1927 to April 1, 1934, in Central Ohio, totals 30,151. As 6215 birds were banded last winter, it seems probable that about 17,000 living Starlings today carry bands placed in this locality. This preliminary report is made now in the hope that banding operators will be encouraged to make a special attempt to trap breeding and migrating adults during the coming summer and autumn. It would also be of tremendous value in the study of the Starling, if a considerable number of nestlings and juvenile birds could be marked. The writer would be pleased to hear from banders interested in this species.—LAWRENCE E. HICKS, Department of Botany, Ohio State University, Columbus, Ohio.

RECENT LITERATURE

(Reviews by Margaret M. Nice)

MIGRATION STUDIES

Bird-Migration at Rossitten.—In "Rossitten"[1] we read of the experiences of the *Vogelwarte* during thirty years on the Kurische Nehrung, and particularly of his studies of migration. A thrilling picture is given of the marvellous flights of waterfowl, passerines, and raptores. Professor Thienemann was one of the pioneers of bird-banding, starting in 1903, and he recounts some of the absurd misunderstandings that arose in the early days and also the opposition of some misguided bird-lovers, one of whom stated that "a single Stork in a meadow is more beautiful and more useful than all the ornithologists and all ornithology!"

When the first banded gull was found in France there was much debate as to what the ring could possibly mean; one person suggested it had been attached by a shipwrecked sailor from a ship named "Rossitten," but another said it must have been a sentimental maiden sending a bird to her lover who kept a bird-shop. A Bulgarian, after shooting a Spotted Eagel with the number 1285, wrote to the paper saying he had killed a bird 726 years old!

The author writes feelingly of the marvel and poetry of bird-banding and ends the book with a plea for the revival of the noble art of falconry.

A later book[2] by the same author is a more technical and detailed study of migration on the Nehrung, giving a migration calendar, and discussing the speed of flight, height of migration according to weather, migration of particular species, etc. It describes experiments in removing parent Martins (*Delichon u. urbica*) from the nest and their return from seven miles distance in forty minutes. Much space is devoted to the experiments with Storks, including an account of how the Vogelwarte induced these birds to nest again in Rossitten after an absence of twenty years.

Both books are delightfully written, well illustrated, and full of valuable information for the bird-student.

The Migration of the White Stork.—The majority of European White Storks (*Ciconia ciconia*) migrate to the southeast through Transylvania and the Balkan Peninsula, thence through Asia Minor to the Delta of the Nile, their objective being South Africa. Birds breeding west of the Weser River fly southwest through France and Spain to Gibraltar. Europeans have debated the question whether the migration-route is in-

[1] J. Thienemann. *Rossitten*. 1930. 3d edition. J. Neumann, Neudamm. 332 pp. 9 RM.
[2] *Vom Vogelzuge in Rossitten*. 1931. J. Neumann, Neudamm. 174 pp. 8 RM.

herited or the young are led by the adults. Thienemann attempted to answer the question by taking young Storks from the nest and keeping them in captivity until all of their kind had migrated; the three sets migrated in the normal direction as far as Roumania, but then apparently deviated from the proper path, as two were taken in Greece and one in Crete.

In the meanwhile several writers[1] have gathered statistics on whether young or old Storks migrate first, and the consensus of opinion seems to be that it is the young. Might it be that the old birds overtake the young in the Balkans and then lead them across the Dardanelles?

Last fall a different experiment was decided upon. Large numbers of young Storks were taken from their nests in East Prussia (where happily they have recently increased),[2] and were raised in Rossitten; 73 were released in Rossitten, 20 from Frankfurt am Main, and 144 from Essen, near the western border of Germany. Each set was colored in a distinctive manner to facilitate "sight returns," and the widest publicity was given to the matter through the newspapers and radio. All the birds went south or southeast (except three released at Rossitten that wandered to Italy), the second and third lots going by the way of Switzerland—"important evidence for the inheritance of the migration direction and its effectiveness even in a locality where the native birds migrate in another direction."[1]

Finnish Migrants from English Eggs[2].—An extraordinarily interesting experiment carried out in coöperation with the Zoölogical Museum of the University of Helsingfors by Karl Fazer, who unfortunately died in 1932. In the spring of 1931 a number of eggs from English Mallards (*Anas p. platyrhynchos*) were sent to Taubila, between the Gulf of Finland and Lake Ladoga; 86 hatched and grew up in freedom on the lake with tame and wild ducks. Regular feeding kept them half-tame, and on August 7th, 62 were banded. The wild Mallards left the middle of October, except for six that remained with the experimental birds; all became restless the middle of November and soon flew south. Eleven were recovered, nine in the winter, all the way from Holland to southwestern France and Jugoslavia, as shown on a map. One duck was found in Holstein in May, 1932, on a nest with twelve eggs; another was found dead July 5th in Baden. In the spring of 1932 no less than 34–36 returned to Lake Ladoga and nested there! The percentage of recoveries—18 is high, and that of returns—55–58 exceedingly high.

English Mallards are strict residents, but these birds behaved like typical Finnish migrants, the recoveries all falling within the regular migration-routes of Finnish Mallards. It will be noted that the birds returned to Finland to nest and not to England.

So here we have a case where "the same individuals in a different locality would have behaved entirely differently." "Hence we can conclude that the migratory instinct in the English Mallard is not lost, but merely greatly weakened or entirely inhibited through climatic influences."

Similar experiments should be tried with other species and in other localities; in particular Finnish Mallard eggs should be hatched in England.

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[1] W. Rüppell, *Vogelzug*, 1931, p. 119; 1933, p. 166.
A. Ohlendorf, *Vogelzug*, 1933, p. 118.

[2] F. Hornberger, *Ornithologische Monatsberichte*, 1934, 42, pp. 26–27.

[1] E. Schüz. 1934. Vom Storch-Versuch 1933 der Vogelwarte Rossitten. *Vogelzug*, 5, pp. 21–25.

[2] I. Valikangas. 1933. Finnische Zugvögel aus englischen Vogeleiern. *Vogelzug*, 4. 159–166.

Russian Banding Papers.—G. Doppelmair[1] reports on the ringing of Mallards and Black-headed Gulls near Leningrad. From 185 of the former banded on the Ilmensee in July of the years 1925–1929, there have been 51 recoveries and 2 returns—28 per cent in all. Most of these ducks migrated southwest, a few as far as Italy and Jugoslavia, but five recoveries were made in England and Scotland, while two were found in the opposite direction—one three hundred miles east of the place of banding and another on the Volga—far to the southeast.

Sixteen recoveries have been reported of the 344 young gulls ringed on Lake Ladoga. These show two migration-routes—one along the coast of the Baltic Sea, the other directly south to the Black Sea. A number of these birds were also taken in north Italy and Dalmatia.

The Bird-Preserve of the Volga Delta[2].—Vast numbers of water-birds nest here and are banded in large numbers—adult ducks and geese being caught with nets during the molt and young of various Herons, Cormorants, Spoonbills, and Glossy Ibis banded in the nest. Some of the ducks and Gray Lag Geese (*Anser anser*) and Night Herons (*Nycticorax n. nycticorax*) have returned to the Delta, but others have been recovered during the breeding-season in western Siberia and central Russia.

Belgian Banding.—Each year M. Ch. Dupond issues a report on the returns and recoveries of birds ringed in Belgium and birds ringed elsewhere taken in Belgium; these are published in "Le Gerfaut" and reprinted as bulletins of the Musée Royal d'Histoire Naturelle de Belgique.[1] It would be of interest to have in each issue a summary of the numbers of birds ringed and numbers retaken, and also brief mention of the more important results in that year.

Fall migration is usually to the southwest, so that the capture of a Belgian-raised Red-backed Shrike (*Lanius c. collurio*) in Italy is noted as of especial interest (4, p. 31). The House Sparrow (*Passer d. domesticus*) is ordinarily retaken within less than a mile of the place of banding, but one bird was captured seven miles away (1, p. 11), and another—an adult when banded November, 1927—was taken four years later at a distance of ten miles (4, p. 24). The Great Titmouse (*Parus major*) is usually resident, but a few have been found as far as three hundred miles from the place of birth (3, p. 32; 4, p. 73). A pair nested two years in succession in the same hole, raising five young the first year and nine the next (4, p. 30). Another bird was found nesting four yards from its birthplace. A Siskin

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[1] Ergebnisse der Beringung von Stockenten (*Anas platyrhyncha* [*sic*]) am Ilmensee. 1933. *Vogelzug*, 4, pp. 149–153.
Ueber Beringungsergebnisse von Lachmöwen (*Larus ridibundus*) des Ladoga-Sees, 1934. *Vogelzug*, 5, pp. 18–21.

[2] K. A. Worobiew. 1932. Das Staatliche Naturschutzgebiet im Wolgadelta bei Astrachan. *Kocsag*, 5, pp. 1–11.

[1] (1) Oeuvre du Baguage des Oiseaux en Belgique. Exercice 1929. 1930. *Gerfaut*, 20, pp. 56–76.
(2) Oeuvre du Baguage des Oiseaux en Belgique. Exercice 1930. 1931. *Gerfaut*, 21, pp. 59–98.
(3) Oeuvre du Baguage des Oiseaux en Belgique. Exercice 1931. 1932. *Gerfaut*, 22 pp. 41–90.
(4) Oeuvre du Baguage des Oiseaux en Belgique. Exercice 1932. 1933. *Gerfaut*, 23, pp. 49–104.
(5) Que nous a appris jusqu'ici le Baguage des Oiseaux en Belgique? 1930. *Gerfaut*, 20, pp. 143–161.

(*Carduelis* [*-Spinus*] *spinus*) banded October 6th was captured seventy-eight miles away the next day.

A considerable amount of data has been collected on the return of Swallows (*Hirundo r. rustica*) and Martins (*Delichon u. urbica*) to their homes, and this has proved the rule with adult birds. In the former species four adults were found nesting in the same place four years in succession (4,p. 40). As to the young, three nested in the next village, five from a half-mile to four miles from the birthplace, and sixteen in the same farm or village, five of these returning to the very nests where they were hatched. Of the Martins ten nested in the place they were hatched, three in the same nest. One of these, banded in the nest in 1928, was retaken there in 1929, 1931, and 1932 (4, p. 45).

Besides these annual reports M. Dupond is the author of an interesting pamphlet (5) on "What has the Ringing of Birds in Belgium taught us?" In this he answers such questions as: Where do our migrating birds winter? From where do the birds come that migrate through Belgium? Are various species partly migratory and partly resident? How much do young birds wander before migration? Do birds return to their place of nesting, etc.?

Fifty Years of Bird Migration.—William Rowan. 1933. *Fifty Years' Progress of American Ornithology* (Lancaster, Pa.), pp. 51–63. The author mentions many of the important American papers on migration, but unfortunately fails to present his own theories and experiments.

Papers by F. C. Lincoln. (1) A Decade of Bird Banding in America: A Review.—*Smithsonian Annual Report*, 1932, pp. 327–351. (2) Bird Banding. 1933. *Fifty Years' Progress of American Ornithology*, pp. 65–87. Excellent summaries of banding in America, in which the author discusses waterfowl-banding, particularly migration and sex-ratio, and, with non-game species, migration and life-history studies. The first paper has two maps and four tables and gives details as to the work of individual banders and stations; the second gives a history of banding in this country and concludes with a section on longevity. The total figures for banding under the United States Biological Survey from 1921 to July, 1932, are 1926 co-operators, 1,123,528 birds banded, and 63,564 returns and recoveries.

TERRITORY

Territory Reviewed. David and Lambert Lack. 1933. *British Birds*, 27, pp. 179–199. The authors contend "that so far sufficient evidence has not been adduced to show that territory is a general law of bird life, and that in especial there is no proof that territory is of food value, or is an important factor in the prevention of over-crowding."

It is undeniable that Howard and many others have applied the territorial concept too widely. The present authors point out that the same species at times may "appear territorial" and at other times nest in colonies, instancing the Great Black-backed Gull (*Larus marinus*), the Great Crested Grebe (*Podiceps cristatus*), and "many Birds of Prey" which are "normally colonial under favorable conditions."

As to the food-value of territories, the Lacks mention how "most territorial species, which are extremely pugnacious at the beginning of the breeding season, do not attempt to maintain strict territories during the feeding of the young—that is, at the very time that the territories, as food territories, would be most valuable." "Finally, it is not proved that pugnacity does limit the number of pairs in a given area." Their alternative theory is: "In fact, territory seems to be nothing more than an affair of the male bird, and its real significance seems to be that it provides

him with a more or less prominent, isolated headquarters where he can sing or otherwise display."

My own experience, based on five years' study of a species strongly territorial in my locality, differs from that of the Lacks in many respects. In the first place, there is no doubt that with *Melospiza melodia beata* territory limits the number of pairs in a given area. When a new male Song Sparrow arrives, all the males already settled try to drive him out, even though there may still be plenty of room. The new bird responds with appropriate behavior and soon wins his place. But there is a limit beyond which the birds refuse to allow themselves to be crowded; each must have approximately two thirds of an acre for his territory, and extra males have to seek other quarters. In 1932, when Interpont was filled to capacity, several of the young resident males were driven out of their territories by adult summer residents. Again, female Song Sparrows defend their territories against both males and females of their own species and to some extent against many other species.

The Lacks say that the "earlier fighting," *i.e.* territory fighting, "apparently ceases in almost all cases when the eggs have been laid." This may be so with a single-brooded species, but is not true with the three-to-four-brooded Song Sparrow. Territory lines are maintained (more or less strictly) till nesting is practically over, and the arrival of a new male as late as July will stir up song and strife to an astonishing degree. To be sure, birds recently out of the nest may settle in a neighbor's territory and be fed there by their mother; the owners may try to drive them out, but soon give up before the passive resistance of the intruders. At any rate, the spacing of the pairs at the beginning of the season is sufficient safeguard for the food-supply in most seasons, and the birds can afford to relax their vigilance.

As to "the great food-shortage delusion," as Tavistock (*Ibis*, 1931, pp. 351–354) describes it, it is certainly true that many birds claim far more land than is necessary for a food-supply. (This author suggests that the reason for "the pugnacity of breeding birds" is that by preventing crowding it operates "as a check on disease.")

With my Song Sparrows, although their territories under normal conditions afford ample support for them and one to two pairs of other birds and their families, yet in the case of a severe drought early in May, 1932, there appeared to be a shortage of insects, for one or more of the young in every nest died of starvation. Hence it may well be that territory with Song Sparrows does represent a safety factor in the matter of food. However, as I have pointed out in the article next to be reviewed, territory with this species in this locality "is as essential for insuring non-interference in the orderly sequence of the nesting cycle, as it is in safe-guarding the food-supply."

The Lacks have done a service in emphasizing the mistakes of blind acceptance of an attractive theory, but their alternative suggestion is unconvincing and does not cover the facts.

The Theory of Territorialism and its Development. M. M. Nice, 1933. *Fifty Years' Progress of American Ornithology*, pp. 89–100. An historical review of the theory of territory, appreciating the value of the concept for some birds, but protesting against its undiscriminating acceptance for all avian life. The paper is summarized as follows: "Territory implies in the male bird isolation, advertisement, fixation and intolerance. Where these four aspects are not present, the bird does not truly hold territory. In the Song Sparrow there is a definite and elaborate procedure for establishing territory with diametrically opposed behavior in the invader

and defender. It is this ceremony which precipitates the change from the prolonged, warbling song of the juvenile to the short song of the adult. It may be that the food aspect of territory has been over-emphasized, and that sex jealousy in many cases plays a definite part."

LIFE-HISTORY

Aves. E. Stresemann. 1933. *Kuckenthal-Krumbach, Handbuch der Zoologie*, Bd. Vii, 2.Halfte, 7.Lief. The seventh section of this monumental work treating all phases of bird-life—anatomy, physiology, behavior, etc.—has now appeared. "Aves" is a mine of information to the serious student of birds, for the author has a world view of the problems, citing examples from birds from all over the world, and referring to writings from an equally wide field. He makes few generalizations, but those few are illuminating. The paper and print are good (the book is quarto size), there are many illustrations, and the style is simple and clear. The present volume is largely concerned with a masterly treatment of the subject of migration.

Advances in Life History Work. H. Friedmann. 1933. *Fifty Years' Progress of American Ornithology*, pp. 101–109. A brief historical sketch of life-history work in America; many important studies are mentioned, but no references are given.

Vogelruf und Vogelsang. Hans Franke. 1933. Leipzig, Deuticke, 110 p. M.2.20. This useful little book on "Bird Calls and Songs" can be unreservedly recommended to the bird-student who goes to Europe. Containing a maximum of information in a minimum of space, it deals not only with the voices of birds, but also with field marks, haunts, season, and something of the habits of each species. Calls and songs are described in great detail, in many cases with musical notation, length of songs in seconds and duration of song season being also noted.

It would be a fine thing to have several such field guides for North America, but their preparation would demand a most thorough acquaintance with, and careful study of, the subject.

ECOLOGY

Papers by C. W. Thornthwaite. (1) The Climates of North America According to a New Classification. 1931. *The Geographical Review*, 21, pp. 633–655. (2) The Climates of the Earth. 1933. *The Geographical Review*, 23, pp. 433–440. A new classification of climates according to precipitation effectiveness, temperature efficiency, and seasonal distribution of effective precipitation. Through mathematical calculations based on mean monthly temperature and precipitation, the author distinguishes thirty-two climatic types for the earth. Thornthwaite's work is considered one of the outstanding achievements in geographical science in recent years; it is a contribution of basic importance that should prove most fruitful to the student of bird-distribution. These papers with their fascinating maps can be heartily commended to all biologists interested in the relations of animals to their environments.

LONGEVITY

The Oldest Banded Bird. E. Schüz (*Vogelzug*, 4, p. 176, 1933) reports that a Herring Gull (*Larus a. argentatus*), banded July 5, 1910, on the coast of the North Sea with a Rossitten ring was found April 22, 1933, on the Island Terschilling (Holland). Herring Gulls of twenty-one and twenty-two years have been reported previously.

In a review of recent articles, "Ring-Wiederfunde auswartige Stationen 8" (*Vogelzug* 4, pp. 168–171), Schüz mentions more than thirty-five ringed birds of twenty-one species that have reached ages from four to ten years. A nine and one-half year Starling (*Sturnus vulgaris*) was reported from Holland.

A Ten-Year-Old Cardinal. A. F. Ganier. 1933. *Wilson Bulletin* 45, pp. 152–154. A male *Richmondena c. cardinalis*, banded February 24, 1924, is still living in the same locality. Mr. Ganier writes me that this bird sings vigorously each pleasant morning, but that "his feathers do not lie as neatly on his body as do those of a young bird. When he leans forward to take food he appears to be *bald*, for the feathers do not flex and they leave the back of the neck exposed." S. P. Baldwin banded a male of this species at Thomasville, Georgia, March 28, 1921, and captured him for the last time February 2, 1930. Lincoln, F. C. 1933. Fifty Years' Progress of American Ornithology, pp. 86–87.

BIRDS AND THEIR FOOD

Experiments on the Digestion of Food by Birds. J. Stevenson. 1933. *Wilson Bulletin*, 45, pp. 155–167. An interesting study on the weight of stomach-contents and rate of food-passage through the digestive tract of some passerine birds, besides other related matters.

Food Preferences of the Long-eared and other Owls are discussed in a thorough-going study by N. Tinbergen[1], who concludes that these birds do not have preferred prey, but specialize on whatever animals happen to be abundant, thus exerting a definite check on the increase of rodent populations.

The Feeding Habits of Four Hens were studied in detail by G. Beck[2], who found among other things that his subjects ate much more when together than when apart, ate less on laying days, much less than normal during the first part of the molt, but far more during the last half. The food averaged per day from 2.7 to 5 per cent of the weight of the fowl, usually about 3.3 per cent. The weight of the water consumed about equalled that of the food.

CONSERVATION

The Conservation Ethic. A. Leopold. 1933. *Journal of Forestry*, 31, pp. 634–643. A thought-provoking analysis, defining civilization as "a state of mutual and interdependent coöperation between human animals, other animals, plants and soils."

Annual Report of the Hawk and Owl Society. 1933. *Bull.* No. 3, 36 pp. Secretary W. F. Eaton, 128 Wildwood Ave., Upper Montclair, N. J. Straight facts in regard to the precarious position of our birds of prey.

The Protection of Hawks and Owls in Ohio. S. P. Baldwin, S. C. Kendeigh, and R. W. Franks. 1933. *Ohio Jour. of Science*, 32, pp. 402–424. This excellent paper, which discusses the problem from every angle, may be obtained from Mr. Baldwin, 11025 E. Boulevard, Cleveland, Ohio.

[1] Die Ernährungsökologischen Beziehungen zwischen *Asio otus otus* L. und ihren Beutetieren, inbesondere den Microtus-Arten. 1933. *Ecological Monographs*, 3, pp. 443–492.

[2] Neue Beiträge zur Zweikomponententheorie des Hungers. 1930. *Ztsch. f. Psychologie* 18, pp. 283–349.

Management of Bobwhite Quail in Iowa. P. L. Errington. 1933. Iowa State College Agri. and Mechanic Arts, Ex. Bull. 186, 15 p. In regard to predators the author writes, "It is a safe principle to go rather 'easy' on native species and to pay more attention to house cats and roving dogs."

The Problem of the Vagrant Cat. T. G. Pearson. 1933. National Assoc. Audubon Societies (1775 Broadway, N. Y.) Circ. No. 18. Recommends the tagging of cats at nominal cost.

In Reply to "A Plea for the Birds." S. A. Eliot, Jr., *Massachusetts Audubon Bulletin*, December, 1933, pp. 6–8. Sane discussion of conservation questions; suggests removing "woodcock, snipe, quail, and all white-bellied ducks from the game-bird list—leaving the pheasant for the fields, the partridge for the woods, the rails for the marshes and the dark-bellied ducks for the water-ways."

Conservation of Game or of Wild Life—Which. W. L. McAtee. 1934. *Scientific Monthly*, February, pp. 165–169. Only ten per cent of the species of vertebrates in our country can be classed as game; thirty per cent are sometimes called "vermin," although most of them are protected by law.

Mrs. Nice on the Song Sparrow. Reviewed by Herbert Friedmann.) Zur Naturgeschichte des Singammers. *Journ. f. Ornith.*, 1933–1934. We may begin with our conclusion,—that this is by far the best, most thorough, and most careful study yet made of any native North American bird (the one non-native species that is better known being the domestic fowl). Mrs. Nice's study clearly demonstrates the value of banding as an aid in field studies, as her paper teems with facts and problems that could not have been even indirectly approached were her birds not thus individualized. For this reason alone, even if the paper contained no new ideas, her study would be noteworthy as an important marker on the road of progressive bird study. The work has been patient and over a considerable span of years; all sides of the life history have been gone into in detail and adequately reported. Even such matters as inheritance of individual song variations, so conspicuous in this species, are treated with new data of great importance to our general considerations of bird song. It is impossible to summarize a paper so full of data as this one without doing it great injustice, and therefore a mere list of the topics discussed will have to suffice. They are as follows: Introduction, including a description of methods and an account of the area in which the work was done; Life History of the Individual Bird; *i.e.*, the problems and difficulties confronting the individual as distinguished from those confronting the species to which the individual belongs, including an account of voice, general habits, enemies such as man, rapacious birds, mammals, and snakes, and a particularly worth-while critical discussion of the relations existing between the Song Sparrow and the Cowbird; Problems of the Whole Population of Song Sparrows; including the highly intricate aspects of migration within the species, the habits at different seasons, reproduction with its included topics of mating, nest-building, the eggs, incubation, and care of the young both in and out of the nest; and such vital questions of bionomics as the distribution in the population of adult birds of various ages; the distribution and position in the whole population of young birds during the breeding season; the mortality rate of the young; longevity; the balance of population density among Song Sparrows in the area where the studies were made. A summary and a literature list of some 83 titles concludes the paper. It is very unfortunate that this paper could not have been published in this country and in English

as it is now relatively inaccessible to a very large proportion of serious bird students who would otherwise have been able to use it. This, however, is another matter and one on which the paper cannot be judged.

CORRESPONDENCE

VALUE OF COLORED BANDS

Editor of *Bird-Banding:* The unquestioned value of colored bands in bird-banding investigations was clearly demonstrated yesterday at our station in Glenolden, Pennsylvania. We had been keenly anticipating the return-5 of White-throated Sparrow (*Zonotrichia albicollis*) 578074, which has wintered with us for the past five consecutive years, but up to January 10, 1934, she had not put in an appearance, and we had about decided her days of usefulness were over. We had been experiencing rather severe winter weather for this region—many cold rains, one heavy snowfall followed by a bad freeze—during which time the birds must have suffered from lack of food, and we felt sure that this bird would have been trapped or observed, had she been in the vicinity, as she wears a bright pink band on the left leg. Last winter she was a "sight return" on November 13, 1932, but it was nearly a month later that she was actually trapped, on December 10th, at which time she still wore the very dull, streaked plumage of immaturity.[1] Confined at home with grippe on January 10th, I spent a good part of the day at a sunny window watching the birds feed at the traps, which were not set at the time. Cardinals, Tits, White- and Red-breasted Nuthatches, Black-capped Chickadees, Downies, Song Sparrows, White-throats, Starlings, and English Sparrows fed continually all day, and while about ninety-five per cent of the birds wore bands, I looked in vain for our old female White-throat, who wears a bright pink band. (No other White-throat we have banded wears a celluloid band of this color.) The afternoon was well spent and the light was beginning to fade, when a dingy female White-throat hopped into view some thirty feet distant. With the naked eye I could discern that she wore a band on each leg. With an eight-power binocular a pink band on the left leg showed plainly. Mrs. Gillespie was hastily summoned to confirm the observation, and we were both well satisfied that 578074 had returned to our station for the *sixth consecutive year*, our best White-throat record to date. Almost a month passed before she was seen again—on February 4th and also on the following day. In spite of a heavy snowfall on February 1st and an unprecedented sub-zero cold spell of ten days from this date, she failed to enter the traps. But, for some unknown reason, on February 11th and 13th, with the snow practically gone and the thermometer in the thirties, she was captured in the trap that she first entered February 22, 1929.—JOHN A. GILLESPIE, Glenolden, Pennsylvania, January 14, 1934.

[1] Mr. Gillespie in the next issue of *Bird-Banding* plans to describe more fully this abnormal occurrence which appears to be that of a White-throat in first winter plumage. Editor.